LITERATURE SEARCH
ON THE
SOLVENT EXTRACTION OF OLEAGINOUS MATERIALS

WEIL ◆ BOLEN ◆ SUGARMAN

ERING EXPERIMENT STATION
RGIA SCHOOL OF TECHNOLOGY

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Literature Search

On The

Solvent Extraction of Oleaginous Materials

With Additional Reference to By-products from the Solvent Extraction of Peanuts

By

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The State Engineering Experiment Station of the Georgia School of Technology is the engineering and industrial research agency of the University System of Georgia. It serves to coordinate and advance the research activities of the School through an integrated program of fundamental and applied research and development, for the purpose of contributing to the general welfare of the State. It is organized to aid directly in the development and integration of industrial and agricultural activities and the better utilization of resources in the South, through its investigations and technological studies.

The affairs of the Station are administered by the Director with the counsel of the Faculty Advisory Council, which consists of members appointed from the faculties of the Georgia School of Technology and other units of the University System of Georgia. The Staff is made up of a Director, Assistant Director, full-time Research Professors, Associate Professors, Assistant Professors, Fellows, Assistants, and Consultants; Faculty Research Associates; and Research Graduate and Technical Assistants.

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To make the results of its scientific investigations available to the public, the State Engineering Experiment Station publishes and distributes technical bulletins. It also publishes circulars which present important information that is not otherwise readily accessible to the public and to the engineering profession; reprints of articles written for technical periodicals by members of the Staff; and special reports prepared for a variety of purposes.

For copies of publications or for other information, please address:

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Preface

This search of the literature on the solvent extraction of oleaginous materials, with special emphasis on peanut oil extraction and by-products therefrom, has been prepared by the Georgia Tech Engineering Experiment Station's Technical Information Service as part of its program of organizing and making more readily available the information contained in the literature.

The solvent extraction of oilseeds has today become a commercial process of considerable significance, especially in regard to cottonseeds, soybeans, and peanuts. As may be noted from the size and scope of the present search, much has already been published on developments in this field, and the tempo of present research and operations gives every indication that interest and attention will continue to increase.

Scope of the Search

This being the case, this search has been prepared in an effort to gather together an indexed, expanded bibliography of the pertinent literature, so that future work might benefit through use of and acquaintance with the existing data. No claim is made that this search is exhaustively complete; however, it is believed that a very large percentage of the pertinent references has been included, since a considerable number of sources were cross-checked for this purpose.

As may be noted, this literature search on the solvent extraction of oil from oleaginous materials is concerned primarily with the extraction of oils from oilseeds. The references included deal with the preparation of the seeds for extraction, solvents used, processes and apparatus involved, methods for separation of the various constituents following extraction, and uses of by-products from the process. Special attention was given to oilseed protein, which may be extracted from the defatted meal by a solvent process or perhaps extracted along with the oil and then separated. Although information on peanuts and peanut protein is of primary interest here at this time because of research being conducted in this field at the Georgia Tech Engineering Experiment Station, all available material on other oilseeds, such as cottonseed and soybeans, has also been included, because of the similarity of the processes and equipment involved in the solvent extraction of their oils.

The secondary literature sources employed in obtaining references and abstracts were Chemical Abstracts, British Chemical Abstracts, Engineering Index, Agricultural Index, Bibliography of Agriculture, Bibliography of Scientific and Industrial Reports, and the abstract sections of Oil and Soap. In the first of these references, the indices to Volumes 1-40 (1907-1946) were consulted on the following subjects: oils, solvent extraction of; peanut oil; peanuts; proteins; and solvent extraction. The individual 1947 issues through September 20 were checked for additional references under the "Fats and Fatty Oils" sections.

A search was made in British Chemical Abstracts from 1920 through 1943 under the subjects of Ardil; cottonseed; cottonseed meal; cottonseed oil; groundnuts; groundnut oil; oil, fatty, extraction of and literature on; oils, vegetable, extraction of and production of; oil cake; oil seeds; peanut oil; proteins, fibers from; seeds; solvents, extraction with; soya beans; and soya bean oil. It should be explained here that during the years 1920-1943 the title of this periodical was changed several times. Until 1925 the volumes consulted were entitled *Journal of the Chemical Society, Abstracts*. In 1925 the publication was *called Journal of the Society of Chemical Industry*; from that time through 1943 it was known as *British Chemical Abstracts*. At this point, the name was changed to *British Chemical and Physiological Abstracts*, which title has since been changed to *British Abstracts*.

The *Engineering Index* was checked for the years 1935 through 1946 under these headings: agriculture; food products, peanut meal; vegetable oils; peanuts; protein fibers; and textile fibers, synthetic. Indices to Volumes I and II for the *Bibliography of Scientific and Industrial Reports*, January, 1946, through September, 1946, were consulted under the subjects of fats, oil, machinery, Germany; fats, extraction; oils and fats, Germany; oils, extractors; oils, Germany; oilseeds: extractors, Germany, mills--Germany, preparation, processing; peanuts; proteins, research; soybeans, processing; and solvents, recovery. Individual issues were consulted through July, 1947. The *Agricultural Index* was checked from 1934 through August, 1947, under the following subjects: Ardil; cottonseed, meal and oil; feeding and feeding stuffs, protein; flaxseed; oils and fats; oilseeds; peanuts; proteins; and soybeans. Volumes 1-11 of the *Bibliography of Agriculture* (July, 1942, through September, 1947) were searched under Ardil; cottonseed, oil, extraction; oils and fats, edible, extraction; equipment, processing; oilseeds, processing; peanuts: oil extraction, processing, products, research, utilization; protein, extraction, fibers, in oilseeds; and soybeans, oil, extraction.

In addition to the references obtained from these abstract journals, a number of additional abstracts were acquired from the abstract sections entitled "Oils and Fats and Drying Oils" which appear in each issue of *Oil and Soap*. These sections were checked from 1932 through October, 1947, except for several missing issues in 1932, 1933, 1941, and 1942. It should be noted that in 1947 the title of this periodical was changed to *The Journal of the American Oil Chemists' Society*.

A number of miscellaneous bibliographies proved to be of value in completing this search. A list of 205 references, entitled "A Bibliography on the Solvent Extraction of Vegetable Oils from Raw Materials, With Special Attention to Soybeans", prepared by A. C. Beckel, *Oil and Soap* *21*, 264-70 (1944), was checked against the accumulated material. Several abstracts were obtained from the 1945 and 1946 bibliographies of articles written by the personnel of the Southern Regional Research Laboratory of the U. S. Department of Agriculture, in New Orleans. Another valuable source of material was the "Review of Scientific Literature on Fats and Oils," published annually in *Oil and Soap*. This feature was edited by R. C. Newton from 1935 through 1937 and by M. M. Piskur from 1938 through 1947.

Whenever abstracts of pertinent patents were not available in the abstract journals, reference was made to the *Official Gazette* of the United States Patent Office, and one of the more inclusive claims of the patent was used as the abstract.

The literature sources are arranged in order of authors' surnames; all anonymous references appear in chronological order in the beginning of the book. Patents appear in numerical order under their respective countries of issue. Source references are given for those references which were obtained from *Chemical Abstracts* (*C. A.*); *British Chemical Abstracts*, regardless of change in title (Br. A.); Engineering Index (E. I.); Bibliography of Scientific and Industrial Reports (B. S. I. R.); Agricultural Index (A. I.); Bibliography of Agriculture (B. A.); Oil and Soap, regardless of change in title (O. & S.); Official Gazette of the United States Patent Office (Off. Gaz.); and the Southern Regional Research Laboratory bibliographies (S. R. R. L., with year of publication). The abstractor's initials are given for those abstracts which were prepared directly from the original sources.

In preparation of the copy, all arbitrary abbreviations used in various abstract journals were eliminated in order to facilitate reading. However, abbreviations of journal titles were not changed and are given as they appeared in the original abstract. Unless otherwise specified, temperatures are given according to the Centigrade scale.

Index

The alphabetical subject index which appears at the back of this volume is based upon the abstracts themselves and is, therefore, only as complete as these are. An attempt was made, however, to provide adequate cross-referencing, and it appears likely that few major omissions have occurred. Numbers listed in the index are abstract numbers, not page references.

In the preparation of the index, chief attention was of course given to subjects directly related to the extraction process, but many references were also made to related subjects mentioned in the abstracts, although it should be clearly understood that no attempt was made in the searching to include all material on these secondary subjects. To be specific, no direct attention was given to the mechanical extraction of oil, although those references which deal with this subject in addition to more pertinent aspects are listed in the index.

References to the solvent extraction of oil from specific materials are indexed under the particular type of oilseed or oleaginous material. However, for completeness, reference should always be made to the general classes of "Oleaginous materials" and "Oilseeds" and to such other general and specific subjects as seem pertinent.

Acknowledgements

Grateful acknowledgement is hereby made to Mr. Ben W. Carmichael, A. H. Carmichael Company, Peanut Brokers, Atlanta, Georgia, for his sponsorship of the task of completing the search through Chemical Abstracts and the checking of a few bibliographies, also for permission to publish at this time the material prepared for him.

References from Chemical Abstracts were noted over a period of years by Dr. Nathan Sugarman, Research Assistant Professor on the Station's staff and director of research on vegetable oils. The present scope of the search is in large measure attributable to the searching, abstracting, and indexing of Marjorie Bolen, research assistant on the staff of the Station's Technical Information Service. Acknowledgement is also made to Betty Anderson for her supervision of editing and to Dathine Brunson, Jean Quinn, and Dorothy Eifler for their assistance in the preparation of the final copy.

The Station, through its Technical Information Service, is engaged in an accelerated program of informational activities which, it is hoped, will aid in the development of better processes and products, thereby contributing to the welfare of Georgia, the South, and the nation as a whole. Only when proper information is available can work be planned and operations conducted in a truly efficient manner.

B. H. WEIL
Chief, Technical Information
Division

-A-

(1) Anon., "Extraction with Carbon Tetrachloride." Chem.-Ztg. 31, 326-28 (1907). - Two years were spent in experimenting with CCl_4 with a view to overcoming some of the difficulties attending its use. The action of the CCl_4 upon many of the ordinary metals used in industrial apparatus has been shown to be quite appreciable. Some experiments carried out by the above works were as follows: equal weights of the metals with equal weights of the tetrachloride (30 g. to 0.5 kg.) were boiled for 20 hours with a reflux condenser, 1/3 of the metal being covered by the solution and 2/3 of the metal exposed to the vapor. The reaction is mainly thus: $2 CCl_4 + Me'' = Me''Cl_2 + C_2Cl_6$. The following percentages of tetrachloride were decomposed: by wrought iron, 0.002 per cent; cast iron, 0.004%; copper, 0.0005%; lead, 0.0013%; zinc, 0.0002%; tin, 0.0005%; nickel, 0.0004%. The same strips of metal were subjected to 20 hrs. boiling with equal volumes of water and CCl_4 having half of the metal in the liquid and half in the vapor. The reaction $CCl_4 + H_2O = CO_2 + 4 HCl$. The percentages of CCl_4 decomposed were as follows: Wrought iron, 0.35%; cast iron, 0.10%; copper, 0.31%; lead 0.013%; zinc, 0.018%; tin, 0.0019%; nickel, 0.0008%. The strong action upon copper and iron which is shown in the above tables is still more severe when the metals are finely divided as the following results indicate:

	After 4 hrs.	After 20 hrs.
Iron	0.45%	3.04%
Copper	1.50%	4.90%
Lead	0.004%	0.013%
Zinc	0.025%	0.07%
Tin	0.01%	0.02%
Nickel	0.002%	0.0038%

Chemically pure and commercial CCl_4 act similarly. The only apparatus at all durable for extraction purposes is one lined with tin. Another difficulty in using CCl_4 is its high cost. To help obviate this, two precautionary measures should be adopted: (1) the air should be exhausted from the apparatus before the solvent is introduced, in order to prevent CCl_4 from escaping with the air; (2) the vapors from the entire system should be drawn through an oil seal which will retain the greater part of the CCl_4. The loss on extraction is 0.5% of the weight of the raw bones; with gasoline the loss is 0.8%. The fat obtained in the former case is superior quality; the bones also are superior to those, extracted with gasoline. The advantages in favor of CCl_4 are: freedom from danger of fire, lower boiling point, making recovery easier, and better product. The physiological action of the CCl_4 is in no way more injurious than that of the commonly used benzene. Workers who have become immune to benzene vapors should exercise caution when breathing CCl_4 vapors the first time.

C. A. 1, 1778 (1907).

(2) Anon., "Manufacture of Peanut Butter." Canad. Chem. and Metall. 18, No. 4, 80 (1934). - Process is described for roasting and grinding peanuts in the preparation of peanut butter. The protein-rich peanut oil has been fed to victims of infantile paralysis with encouraging results.

M. B.

(3) Anon., "Solvent Extraction of Oil." Engineering 150, 496-97 (1940). - The selection of the solvent and the operation of typical plant (illustrated) for the extraction of oil seeds are described, as also is the recovery

of solvent from the vapour-laden atmosphere from the extraction plant (by absorption on C).

Br. A. BII, 51 (1941).

(4) Anon., "Soybean Oil Extraction with Normal Hexane." Chem. & Met. Eng. 48, No. 9, 128-31 (1941). - Flowsheet of Allis-Chalmers plant installed for Honeymead Products Company of Cedar Rapids, Iowa. At normal tonnage and residual fat content of meal of 0.65%, the solvent to bean ratio is 0.9:1 by weight. Low power consumption: 65 kw.-hr. per ton. Labor is 0.7 man-hr. per ton.

(5) Anon., "Peanut Protein Textile Fiber." Rayon Textile Monthly 24, 112 (1943). - Comprehensive discussion of the use of peanut protein as a textile fiber--properties.

(6) Anon., "Properties of Synthetic Fibers." Textile World 93, No. 9, 108-12 (1943). - Includes soybean, peanut protein, and corn meal fibers, and synthetic rubber yarns.

(7) Anon. United States Manufacturers of Equipment for Processing Cottonseed and Peanuts into Oils, Meal, and Byproducts. Mimeographed. AIC-98, 1945. - This is an alphabetical list of most of the manufacturing companies serving processors of cottonseed and peanuts. In addition is given a cross listing under the type of equipment manufactured.

S. R. R. L. 1945.

(8) Anon. Process for Light-Colored Peanut Meal. USDA 1521-45, 1945.

(9) Anon., "Ardil, a New Synthetic Fibre Developed by Imperial Chemical Industries, Ltd." Soc. Dyers and Colour. J. 61, 52 (1945); Can. Chem. and Process. Ind. 29, 88 (1945). - Ardil, made from the protein extracted from peanuts, is a fiber similar to wool, but it does not shrink and is not attacked by moths. After extraction of the protein, the remaining oil and residue are suitable for use as human foodstuffs and cattle-feed.

M. B.

(10) Anon., "Ardil--A New British Synthetic Fiber." Indus. Chem. 21, 13-15 (1945). - Ardil, the fiber made from the solvent-extracted protein of the peanut, has shown very good results in wearing tests. When woven into fabrics in combination with wool, the Ardil forms a cheaper and lighter, though warm, cloth. When mixed with cotton or rayon, Ardil gives a warmth, fullness of handle, resilience, and crease resistance to the fabric.

M. B.

(11) Anon., "Vegetable Fibers and Synthetic Fibers." Am. Dyestuff Reporter 34, 228 (June, 1945). - Ground-nut protein in fiber manufacture.

(12) Anon., "Newest Extraction Process Will Get Last Drop of Oil." Paint, Oil, & Chemical Review 109, No. 17, 9 (1946). - The Sherwin-Williams Com-

pany has perfected a solvent extraction process which can extract 98.5% of the available oil from vegetable matter in a one-hour treatment. All oil extracted is of top quality and contains the unharmed protein material suitable for industrial use. This one plant can be adapted for the extraction of oil from any type of oil seed.

M. B.

(13) Anon. (Editorial), Ind. Eng. Chem. 38, No. 12, Suppl. page 16 (1946). - An entirely new method for the solvent extraction of cottonseeds has advanced to pilot plant testing at the U. S. D. A. Southern Regional Research Laboratory.

O. & S. 24, 119 (1947).

(14) Anon., Food Preparations from Groundnut Cake. Science Museum, London, Science Library Bibliographical Series No. 638, 1947. 2 pages. - Bibliography.

M. B.

(15) Anon., "Vegetable Oil." Chem. Engin. 54, No. 5, 160-63 (1947). - A flowsheet and photographs illustrate the method of solvent extraction of oil from cottonseed employed in a new processing plant in Wilson, Arkansas.

M. B.

(16) Anon., "Delta Products Co., Wilson, Arkansas, Operates First Solvent Extraction Plant." Oil Mill Gazetteer 51, No. 9, 13-17 (1947).

(17) Altschul, A. M., Karon, M. L., Kyame, L., and Hall, C. The Respiration and Storage of Cottonseed. Presented at a Meeting of the American Society of Plant Physiologists. (March 30, 1946, St. Louis, Missouri). - In an investigation of the relationship of the respiration of cottonseed to the other processes which take place during storage, the effect of moisture content, maturity, and inhibitors on respiration and rate of lipolysis were studied. Measurements were made over a period of a year on samples from three varieties of cottonseed grown in widely separated localities and taken at different times of the harvest season. The average respiratory quotient of cottonseed is unity, and is independent of moisture content, variety, place of growth, or harvest period. The average respiration intensity increases with and is a smooth function of moisture content. Periodic free fatty acid analyses furnished data for determining lipolysis rate constant, which was shown to increase regularly with increase in moisture content. Values calculated after application of inhibitors showed that ammonia treatment inhibited both respiration and lipolysis, Nacconol NR inhibited lipolysis but stimulated respiration, and the other treatments stimulated respiration but had little or no effect on lipolysis. This lack of parallelism suggests that the bulk of deteriorative processes may be due to the activity of the seed enzyme systems rather than to microbial activity; for while it is conceivable that certain biological functions would be more susceptible to inhibition than others, it could be expected, if micro-organisms were the sole cause of deterioration, that inhibition of microbial growth would affect respiration and lipolysis in a similar manner. Throughout the experiments, the behavior of immature and of mature seeds seemed to differ.

(18) Altschul, A. M., Curet, M. E., Karon, M. L., Hall, C., and Smith, B. A., "The Storage of Cottonseed. IV. Mill-Scale Tests on the Effects of

Various Treatments of Cottonseed and Flaxseed on Heating and Free Fatty Acid Formation During Storage." Oil Mill Gaz. 50, Nos. 8, 9, 11, 13, 23 (1946). - An ammonia treatment of cottonseed that had been successful in improving the storage properties of moist cottonseed in laboratory and small pilot-plant experiments proved to have no application, under present methods, when extended to mill-scale experiments. The vapors found in a commercial preparation of sodium alkyl aryl sulfonates in both laboratory and mill-scale tests inhibited the heating and rate of free fatty acid formation in cottonseed and flaxseed.

S. R. R. L. 1946.

(19) Alyavdin, N. A., "The Effect of Separate Production Factors on Extraction Processes." Legkaya Prom., No. 1-2, 24-26 (1943). - A mathematical analysis of the effect of: decantation of juice, degree of comminution of the solid, number of diffusers per battery, working temperature, etc.

C. A. 38, 513 (1944).

(20) André, E. and Pradain, J., "Application of the Selective-Solvent Technique to the Separation of the Immediate Principles of Karite Fat." Compt. Rend. 224, 1445-47 (1947). - By use of apparatus incorrectly called "perforator" or "diffusor" André and Prodain have separated the fat from the seeds of the tree, Butyrospermum parkii, into various fractions. In addition to the glycerol fatty acid esters, 4 isomeric alcohols having the formula $C_{30}H_{49}OH$ are present, probably originally as cinnamic esters.

C. A. 41, 5733 (1947).

(21) Anthony, D. S., Quackenbush, F. W., and Steenbock, H., "Crystallization at Low Temperatures as a Technique in the Analysis of Oils." Oil & Soap 20, 53-5 (1943). - Saturated acids of 16 seed oils were separated by quantitative crystallization from acetone solution at -40°. The 3 unsaturated acids, oleic, linoleic, and linolenic, were calculated from the I number and thiocyanogen values of the remaining liquid acids. Analysis of known mixtures of fat acids showed the accuracy of the method to be 2 units %. Duplicate determinations of the fat acid distribution in natural oils agreed within 0 to 4 units %. Three tables of results are given and 13 references.

C. A. 37, 3290 (1943).

(22) Arbuzov, G. A. and Kats, A. M., "Production of Casein Fiber Resistant to Hot Water." J. Applied Chem. (U. S. S. R.) 15, 354-61 (1942). - (French summary). A method of chrome-tanning of casein fiber was developed that assures a high resistance to the action of hot water; hence the fiber can be dyed along with wool, and the textile can be carbonized. The fiber strength is 70% of that of wool. The spun fiber is dipped into formalin solution containing NaCl or Na_2SO_4 for 8-10 hours at pH 4-5; after drainage, it is washed with water and tanned with basic Cr salts for 1 hour at 45°.

C. A. 37, 4252 (1943).

(23) Armstrong, R. T. and Kammermeyer, K., "Countercurrent Leaching. Graphical Determination of Required Number of Units." Ind. Eng. Chem. 34, 1228-31 (1942). - The graphical method is based on a curve relating the concentration of the leach solution in successive stages. This curve is easily obtained from a few experiments and an equation which permits the calcula-

tion of the next higher concentration from the experimental data. The method takes into account the effects of adsorption of the solute by the solid and of incomplete mixing and should therefore be somewhat more accurate than other available methods. 11 references.

C. A. 36, 6843 (1942).

(24) Arnold, L. K., "Community (Soybean Oil) Plant." Soybean Digest 1, No. 12, 4-5, 12 (1941). - Progress in the development of small extraction units, based on the use of trichloroethylene as a solvent, is described.

C. A. 36, 1796 (1942).

(25) Arnold, L. K., "Extraction of Soybean Oil with Various Solvents." Iowa Acad. Sci. Proc. 51, 309-11 (1944). - The average percentage of oil extracted by the various solvents was hexane, 18.3; CCl_4, 18.4; ethylene dichloride, 18.8; methylene chloride, 19.1; chloroform, 19.5; and trichloroethylene, 19.6. Since CCl_4 gives results not appreciably different from hexane, it might be substituted in the analytical determination of the oil. However, because of the lower boiling of methylene chloride and greater ease of removal from the oil sample it seems preferable to use it. Trichloroethylene and chloroform are likewise not recommended because of the long time required to remove them from the oil. For commercial purposes various technical considerations, such as freedom from corrosive action, indicate that trichloroethylene, methylene chloride, and ethylene dichloride are the most suitable. Of these, the latter is not strictly nonflammable. Trichloroethylene is being applied commercially to solvent extraction of soybeans, and it is possible that methylene chloride, which is practically as good a solvent and has a lower boiling point, can also be used. Availability and price may be the deciding factor between the two.

C. A. 40, 3009 (1946).

(26) Astbury, W. T., "Artificial Protein Fibers: Their Conception and Preparation." Nature 155, 501-03 (1945). - The important role of X-ray analysis in the determination of the structure of fibrous and nonfibrous proteins is reviewed and illustrated by the development of Ardil, a fiber like wool made from the peanut globulin arachin, and of high strength fibers made from egg albumin.

C. A. 39, 3163 (1945).

(27) Atwood, F. C., "Natural Protein-Base Spun Fibers." Ind. Eng. Chem. 32, 1547-49 (1940). - The name "prolon" is suggested for the class of fibers spun from natural protein-bases. Such fibers are hygroscopic and may be dyed with the same dyes as used for wool. It appears that considerable care must be exercised in producing as well as processing the fiber. The requirements of a satisfactory protein-spun fiber are described.

C. A. 35, 901 (1941).

-B-

(28) Bailey, A. E., Feuge, R. O., Kraemer, E. A., and Bauer, S. T., "Modification of Vegetable Oils. New Products by the Fractional Crystallization of Glycerides from Petroleum Naphtha." Oil and Soap 20, 129-32 (1943). - Low-temperature fractional crystallization from solvents under commercial conditions can be used to produce useful new products from cottonseed and peanut oils. An olive-oil-like product can be prepared from peanut oil by first hydrogenating it to a maximum formation of oleic acid and removing the higher-melting portions by fractional crystallization from petroleum naphtha at a low temperature and filtering off the liquid fraction. The modified oil does not deposit crystals or solidify except at near freezing temperatures. The I number is lower than for any natural vegetable oil and it is liquid at ordinary temperatures and its stability is outstanding, having keeping qualities of 30-40 hrs. by the Swift method. The solvent winterization of cottonseed and peanut oil can be carried out successfully in the apparatus devised which consists of a combined chilling and filtering cylindrical chamber provided with scraper blades and having a filter at the bottom similar to a Büchner funnel. With peanut oil good results are obtained by first subjecting the oil to molecular rearrangement with glycerol or a metal as catalyst; this eliminates the formation of difficultly filterable crystals.

C. A. 37, 5264 (1943).

(29) Bailey, Alton E., "Oils, Fats, and Related Products", in The Chemistry and Technology of Food and Food Products, Morris B. Jacobs (Editor), Interscience Publishers, Inc., New York, 1944. Volume II, pages 688-714.

S. R. R. L. 1945.

(30) Bailey, A. E., "The New Chemistry and Technology of Oils and Fats." Chronica Botanica Co. Waltham, Mass. 9, 128-35 (1945). - A review of previous research aspects, together with a summary of the major problems involved in future research, with regard to the chemistry and technology of oils and fats, is presented. From this point of view the following topics are discussed: the occurrence of fats and oils; the utilization of fats; the composition and structure of natural fats; the preservation of edible fats; the fractionation of fatty materials; the polymerized oil products; and the surface-activity of fat derivatives. The largest present source of oils comprises the seeds of annual plants, such as cotton, flax, peanuts, and soybeans. The important animal fats are butterfat and the body fats of cattle, hogs, and sheep. The largest and most important use of fats and oils is for food, with use for soap ranking second, and paint and other drying-oil products, third.

S. R. R. L. 1945.

(31) Bailey, A. E., Industrial Oil and Fat Products. Interscience Publishers, Inc., New York, 1945. 735 pages.

(32) Bailey, A. E., Singleton, W. S., and Feuge, R. O., "Phase Investigation of Fats. I. Apparatus and Techniques for Fat-Solvent Systems at Low Temperatures." Oil & Soap 23, 201-04 (1946). - The fractional crystallization of natural mixtures of fatty acids is largely an empirical operation. A beginning toward placing the process on a scientific basis can be expected

after complete phase diagrams have been made for fat-solvent systems containing more than one fatty component. Considerable experimental difficulties are involved in equilibrating and separating mixtures of fats and volatile solvents at low temperatures. The construction and use of an apparatus are described for carrying out these operations. These details do not lend themselves to abstracting adequately.
C. A. 40, 4535 (1946).

(33) Baker, Edwin M., "Simplifying the Calculation for Countercurrent Extraction." Chem. & Met. Eng. 42, 669-71 (1935). - Hawley's equations (C. A. 14, 2054) are extended to broader applications in continuous and batch countercurrent extraction; Dorr thickeners are used.
C. A. 30, 7390 (1936).

(34) Baker, Edwin M., "Calculation Methods for Countercurrent Leaching." Trans. Am. Inst. Chem. Engrs. 32, 62-72 (1936). - This paper deals with the general cases of continuous countercurrent extraction, batch countercurrent extraction, with descriptive problems and their solutions resulting from extensions of the Hawley equations. C. A. 31, 6060 (1937).

(35) Barnick, G., "A Practical Extraction Apparatus for Treating Fatty and Oily Materials with Volatile Solvents." Chem. App. 1, 209-11 (1914). - Structural details. C. A. 8, 3509 (1914).

(36) Basore, Cleburne, A., "Some Potential Industrial Opportunities in the Utilization of Agricultural Wastes in Alabama." Bull. Alabama Polytech. Inst. 34, No. 12 (1939). 14 pages. - Possibilities are suggested of the utilization of wastes from corn, cereals, peanuts, cotton, and wood. The application of mineral resources of the state in the utilization of these wastes is discussed.
C. A. 33, 7430 (1939).

(37) Basu, U. P., "Food and Medicine from Groundnut." Indian Farming 4, 451-53 (Sept., 1943). - Composition and uses of the peanut.

(38) Basu, U. P. and Sen-Gupta, S. K., "Utilization of Groundnut Meal." J. Indian Chem. Soc. 21, 389-90 (1944). - Commercial meal (after hydraulic expression of the oil) is compared with the meal obtained after extraction of the oil by light petroleum, b. 50-60° C. Analyses (for H_2O), ash, Et_2O-extract, protein, fiber, carbohydrate, and nicotinic acid) do not differ greatly, but extraction of nitrogenous matter by NaOH or NH_3 (with or without NaCl, and at various pH's) is always greater from the solvent-extracted meal; this suggests that the commercial process causes a change in the proteins. Extractions are higher at pH's greater than 8.5. Peptization (54-100% in 24 hours) is effected by enzymes (papain, trypsin, or pepsin), and by refluxing with 20% HCl. The meal can be utilized for human food, adhesives, plastics, water paints, etc.
C. A. 40, 4812 (1946).

(39) Basu, U. P., Sen-Gupta, S., and Misra, A. S., "Utilization of Groundnut Meal. III. Food Protein." Indian Chem. Soc. J., Indus. and News Ed. 9, No. 1-2, 53-6 (1946).

(40) Beckel, A. C., Brother, G. H., and McKinney, L. L., "Protein Plastics from Soybean Products--Relation of Water Content to Plastic Properties." Ind. Eng. Chem. 30, 436-40 (1938). - Addition of water to soybean protein produces a sticky mass which cannot be worked like casein protein. This can be corrected by the addition of 10% $Al_2(SO_4)_3$, thereby making this product available for plastic material similar to casein plastics. Reduction of the moisture content by different methods to 5% or less yields a different type of plastic material not requiring added water for molding; in this it is different from casein. This plastic property exists at as low as 2 to 3% moisture content and will probably permit the addition of this protein to other plastic materials of water-repelling nature as well as the possible use of it as a dehydrated protein type of plastic. Linseed meal, cottonseed meal, lactic acid, and rennet casein did not show plastic properties at lower moisture content. Zein showed flow at zero moisture content. A method of measuring plastic flow is proposed. It consists of pressing a definite disk under definite conditions of temperature, time, and pressure; the decrease in thickness is divided by the original thickness and the quotient is called the coefficient of plastic flow.

C. A. 32, 3853 (1938).

(41) Beckel, A. C. and Hopper, T. H., "Moisture Content of Soybean Oil Meals." Indus. and Eng. Chem. 33, No. 11, 1448-52 (1941). - Soybean oil meal samples studied were commercial products resulting from current methods of processing, namely, hydraulic meal, solvent-extracted meal, expeller meal, and toasted solvent-extracted meal; these were studied at 105° and 130° C. in vacuum oven and at 130° C. in air and in nitrogen; drying curves for toasted solvent-extracted meal determined at 80°, 90°, and 100° C. in vacuum oven. Bibliography.

E. I. 1941, 1259.

(42) Beckel, A. C., Bull, W. C., and Hopper, T. H., "Heat Denaturation of Protein in Soybean Meal." Ind. Eng. Chem. 34, 973-76 (1942). - Soybean meal, with oil extracted by solvent naphtha, was heated at temperatures from 60° to 127° and relative humidities from 18 to 100%, and H_2O-solubility of protein was determined at intervals. The rates of denaturation calculated from this were approximately unimolecular, and increased with both temperature and relative humidity, with a temperature coefficient of about 6 per 10°. The reaction was almost complete in 2.5 hrs. at 127° and 100% humidity. The pH and the percentage of extractable nonprotein N remained unchanged. Reflectance, as determined with a spectrophotometer, paralleled the denaturation but could not be used as a quantitative measure. The denatured material could be molded and is of interest as a low-cost, H_2O-stable plastic.

C. A. 36, 7180 (1942).

(43) Beckel, A. C., "Bibliography on the Solvent Extraction of Vegetable Oils from Raw Materials." Oil & Soap 21, 264-70 (1944). - 205 references are given.

C. A. 38, 6119 (1944).

(44) Beckel, A. C. and Smith, A. K., "Alcohol Extraction Improves Soya Flour Flavor and Color." Food Ind. 16, No. 8, 616, 664 (1944). - Hexane and its homologues are the solvents used in commercial practice for the extraction of oil from soybeans, but it has been found that ethyl alcohol is more

successful in removing the color, bitter taste, and much of the beany flavor from the product. Value of the soybean protein as a food is discussed.

M. B.

(45) Beckel, A. C., Belter, P. A., and Smith, A. K., "Laboratory Study of Continuous Vegetable-Oil Extraction. Countercurrent Extractors, Rising-Film Evaporator, and Oil Stripper." Ind. Eng. Chem., Anal. Ed. 18, 56-8 (1946). - An apparatus for the laboratory study of continuous countercurrent extraction of vegetable oils is devised which eliminates a number of the difficulties usually encountered in batch extraction, such as lack of information regarding the requisite ratio of solvent to solid, proper contact time, the deleterious effect on the oil and by-products by prolonged heating during batch concentration, and the danger of overheating and foaming while the last traces of solvent are stripped from the oil. The apparatus has a continuous countercurrent extraction unit (including the meal drier), a solvent- and by-product-recovery unit, and an oil-stripping unit. The extractor consists essentially of a bent, horizontal tube through which a continuous strip of galvanized iron window screen moves as a conveyor. The efficiency of the extractor, under practical conditions, for the extraction of soybeans, is indicated by the following residual oil figures: 0.39% (hexane-Skelly B), 0.62% (absolute EtOH), 0.54% (absolute isopropanol). A rising-film evaporator which is capable of continuous operation with natural circulation, and which, with a slight change, may also be used as a continuous oil stripper, is assembled from standard glass equipment.

C. A. 40, 1331 (1946).

(46) Belter, P. A, Beckel, A. C., and Smith, A. K., "Soybean Protein Production." Ind. Eng. Chem. 36, 799-803 (1944). - A process consisting of extraction of soybean flakes, separation of suspended solids from the dispersion, precipitation, and dewatering is described giving satisfactory results on a pilot plant scale. The superiority of ethanol-extracted flakes for processing soybean protein is shown.

C. A. 38, 5616 (1944).

(47) Benedict, Manson and Rubin, L. C., "Theory of Extractive and Azeotropic Distillation." Can. Chem. Process Inds. 29, 746-48, 756 (1945). - Schematic flowsheets are shown for extractive distillation, azeotropic distillation in which solvent and overhead are partially miscible, and azeotropic distillation in which solvent is miscible with overhead. Applications are indicated.

C. A. 40, 505 (1946).

(48) Bezuglov, P. T., "The Fire Hazards from Liquefied Petroleum Gases." Pozharnaya Tekh., No. 3, 6-9 (1941). - The physicochemical properties of liquefied propane, propylene, butane, and butylene are tabulated, the manufacture and properties of liquefied petroleum gases are described, and causes which may ignite these gases are discussed, as well as the suitable storage and transportation of the liquefied gases. Fires from liquefied petroleum gases of a vapor tension higher than 3.1 kg./sq. cm. can be extinguished with foam only with much difficulty. The maximum vapor tension of burning liquids which can be extinguished relatively easily lies within the limits of 2.46-2.80 kg./sq. cm. C. A. 38, 3130 (1944).

(49) Bighouse, H. H., "A New Continuous Process of Oil Extraction." Chem. and Met. Eng. 41, 482-83 (1934). - A continuous oil extraction process for

extracting oil from soybeans, cottonseed, tung nuts, linseed, etc., now in use in some plants is described. The extraction unit consists of a steel tank placed vertically, having a cone-shaped bottom section on the center axis, in which is built a steam-jacketed section which extends downward to the upper region of the cone. The solvent is passed downward through the steam-jacketed section while the minced oil-bearing mass is passed countercurrentwise. Operation cost, power, steam, and solvent loss are claimed to be lower by the process.

O. & S. 12, 107 (1935).

(50) Bilbe, C. W., "Continuous Solvent Extraction of Vegetable Oils." Mech. Eng. 63, 357-60 (1941); Chem. and Met. Eng. 48, No. 4, 85 (1941). - The performance of a 120-ton continuous soybean extraction plant is described together with processing cost analysis showing $0.92 per bushel.

C. A. 35, 4234 (1941).

(52) Bilbe, C. W., "Planning the Solvent-Extraction Plant." Oil Mill Gaz. 51, No. 7, 39-42 (1947). - The equipment, housing, safety measures, etc., for a 200-ton-per-day solvent plant are described. Such a plant is priced at $390,000. Its products, due to better oil recovery, are estimated to be valued $5.50 per ton (of raw material processed) more than those from an equal capacity hydraulic plant.

C. A. 41, 2917 (1947).

(53) Bjorksten, J., "Industrial Protein Chemistry." Chem. Industries 51, No. 3, 366-70 (1942). - 167 patents are listed, many on soybean proteins.

M. B.

(54) Block, Richard J. and Bolling, Diana, "Nutritional Opportunities with Amino Acids." J. Am. Dietet. Assoc. 20, 69-76 (1944). - Essential amino acids were determined in various foodstuffs with the following results. Milk proteins are well balanced and of high biological value. Human milk yields significantly more arginine, tryptophan, cystine, and methionine than cow milk. Blood protein contains high concentrations of histidine, lysine, and threonine, but is deficient in methionine and isoleucine. Egg protein is high in arginine and the amino acids. Casein is low in arginine, cystine, and glycine. There is no difference between meat and fish muscle proteins except that lysine is higher in meat. Meat has more lysine but less tryptophan and cystine than egg. Gelatin is of low nutritive value. Whole yellow corn is richer in tyrosine, methionine, leucine, and valine, but poorer in tryptophan and phenylalanine than whole corn wheat. Comparison of the embryos of corn and wheat shows that corn is a better source of all the aromatic amino acids and the leucine group. Both germ proteins, however, are well balanced and compare favorably with the common animal proteins, and feeding experiments endorse this. Cottonseed, linseed, and peanut proteins have adequate amounts of arginine and histidine but are low in lysine. Linseed meal is high in tryptophan. Cottonseed and peanut proteins are low in methionine and threonine but high in valine. Soybeans and yeast are good substitutes for animal proteins.

C. A. 38, 2709 (1944).

(55) Boatner, C. H., Caravella, M., and Kyame, L., "Quantitative Determination of Extractable Gossypol in Cottonseed and Cottonseed Meal. A Spectrophotometric Method." Ind. Eng. Chem., Anal. Ed. 16, 566-72 (1944). - The

reaction of gossypol with $SbCl_3$ in ether and $CHCl_3$ extracts of cottonseed is specific and the reaction product is sufficiently stable to permit accurate spectrophotometric determination of the gossypol concentration of such abstracts. A rapid direct method for determination of free gossypol in cottonseed is reported, in which the gossypol is extracted by equilibrating ground cottonseed and $CHCl_3$, treating the extract with concentrated HCl, and applying the $SbCl_3$ reaction directly to the treated extract.

Author's Summary.

(56) Boatner, Charlotte H. "The Pigments of Cottonseed." Oil and Soap 21, 10-5 (1944). - A method for the purification of gossypol has been developed which yields materials differing in optical properties from those previously reported for gossypol preparations. A colorimetric test for extractable gossypol has been described. It has been shown that cottonseed contains at least three pigments in addition to gossypol. Some of the properties of the three pigments have been reported. One of these newly detected pigments, gossypurin, has been shown to be the substance, which, mixed with gossypol, constitutes the "red gossypol" of Podoe skaya. The frequently reported, water-dispersable, blue pigment of cottonseed has been shown to be either a complex of gossypol-gossypurpurin and protein or a mixture of two protein-pigment complexes. Its dissociation into the two pigments and protein has been accomplished. The gossypol studied was prepared by extracting defatted cottonseed meal in a Soxhlet apparatus with peroxide-free ether.

Author's Summary.

(57) Boatner, Charlotte H., Caravella, Maizie, and Samuels, Carolyn S., "An Orange-Colored Pigment of Cottonseed." J. Am. Chem. Soc. 66, 838-39 (1944). - An orange-colored pigment was isolated from cottonseed by re-extracting an ethereal extract of cottonseed with sodium hydroxide containing sodium dithionate and treating the ethereal layer with acetic acid. Characteristics of this pigment are compared with those of gossypol.

M. B.

(58) Boatner, Charlotte H. and Hall, Catherine, "Pigment Glands of Cottonseed. I. Behavior of the Glands Toward Organic Solvents." Oil & Soap 23, 123-28 (1946). - The efficacy of a given solvent for the extraction of the gland pigments of cottonseed is determined not only by its solvent power for the pigments but also by its ability to attack the pigment glands and the extent to which these glands are exposed to its action, which in turn depends upon the degree of subdivision of the seed being extracted. The properties of the pigment glands have been utilized for the development of a method for mechanically fractionating cottonseed into pigment glands, embryo tissue, and hull tissue. The process consists in the treatment of finely divided cottonseed with mixtures of inert liquids having densities intermediate between those of the seed parts being separated. The fractionation method has been shown to be applicable to the preparation of pigment glands and pigment-free oil and meal from flaked cottonseed. The method has also been shown to be applicable to the separation of pigment glands from defatted cottonseed. 16 references.

C. A. 40, 3024 (1946).

(59) Bomer, A. and Grassfeld, O., The Occurrence, Extraction, and Properties of Refined Fats. Handbook of Food-Chemistry. Vol. IV. Fats and Oils. Johann Grassfeld, Editor; Springer Verlag, Berlin, 1939. 966 pages.

(60) Bonnet, J., "Apparatus for Extracting Oily Matter by Trichloroethane." Bull. Trimestrid Office Reg. Agr. Midi. 1, 11-23 (1922). - Bonnet uses noninflammable, incombutible, and inexplosive $MeCCl_3$. As it is sensitive to light it should always be stored in metal receptacles underground, care being taken to cover it with a layer of water 0.25 m. to 0.40 m. to prevent evaporation. Extraction requires 2-3 hrs. The solvent is recovered by steam distillation.

C. A. 17, 2514 (1923).

(61) Bonnet, J., "The Production of Grape-Seed Oil." Bull. Mat. Grasses Inst. Colonial Marseille 26, 186-88 (1942); Chem. Zentr. 115, 598 (1944). - A practical method for the extraction of dry, pulverized grape seed is reported. The material is extracted with $CHClCCl_2$ at 70-80° C. The oil-containing solvent is then removed by distillation with steam at 100° from a second vessel. It is recommended that the operation be carried out on a small scale (2.4-2.5 metric tons daily) in the region of the vineyard. The marc of a normal vintage contains about 33-4% skins, 20-2% seeds, and 45-7% pulp. The distilled or washed marc keeps very well. About 11-12% of oil can be obtained from the dried seeds. The marc is first passed through a continuous press, then through a sorting device. In the former the seeds are freed from the pulp and pulverized; in the latter the mass is separated into skins, seeds, and pulp. The skins can be used as fuel and the pulp as compost. Such pulp compost contains on an average N 2.3-2.4, H_3PO_4 0.17-0.20, and K_2CO_3 0.5-0.6%.

C. A. 41, 5325 (1947).

(62) Bonotto, M., "Safety in Solvent Extraction." Oil & Soap 14, 30-3 (1937). - Among the general precautions recommended are: all pipings handling solvent should be welded; differences of voltage between sections of pipe lines or machines should be avoided; the use of compressed air in pipe lines generates static electricity and should be avoided; metallic moving parts that could cause sparks should be made of bronze, brass, or Cu. The sewer from the building should be trapped several times before reaching the main sewer to avoid the escape of solvent. Pipes handling solvent should have no U-bends. Solvent spilled on the floor should be diluted with CCl_4 from pint bottles kept for that purpose. Continuous extraction is preferable as there is no periodical opening and closing of extractors.

C. A. 31, 2312 (1937).

(63) Bonotto, M., "Solvent Extraction (in the Oil Industry), Past and Future." Oil & Soap 14, 310-11 (1937). - Mostly an argument for solvent extraction as against pressing methods.

C. A. 32, 1126 (1938).

(64) Bonotto, M., "The Characteristics of a Modern Continuous Solvent Extraction Plant." Oil Mill Gaz. 51, No. 2, 31-3 (1946). - For oilseeds.

(65) Bonotto, M., "The New and the Old in (Vegetable) Oil Extraction." Oil Mill Gaz. 51, No. 4, 26-9 (1946).

(66) Bonotto, Michele, "The Problem of Fines in Continuous Solvent-Extraction Systems." Oil & Soap 23, 297-99 (1946); Oil Mill Gaz. 51, No. 10, 19-21 (1947). - The difficulties caused by fines in the various stages of a

continuous solvent-extraction system are discussed. Bonotto's idea of a successful extraction system is one which includes an extractor which extracts and filters at the same time in a 100% countercurrent way and which does not produce fines, but can accept fines returned to it after being separated from the miscella; a system which includes solvent eliminators which can handle material no matter how dusty without sending dust to the condensers; a system which also includes a distilling system so designed that it may process miscella containing a reasonable amount of fines without imparing the quality of the oil. Such a continous process has been in successful operation since 1940.

C. A. 40, 6850 (1946).

(67) Bonotto, M., "The New and the Old in Oil Extraction." Oil Mill Gaz. 51, No. 7, 32-6 (1947). - The principles, economics, and the future of oil milling are discussed with emphasis on modern solvent-extraction methods.

C. A. 41, 2917 (1947).

(68) Boruff, C. S. and Miller, Dwight, "Solvent Extraction of Corn Oil From Distillers' Grains." Oil & Soap 14, 312-13 (1937). - By solvent extraction of the dried distillers' grains it is possible to recover nearly all of the corn oil present in the original grain, and it is necessary to work with only 35 to 40% of the total weight of grain as 60 to 65% has been removed during fermentation. Low-boiling petroleum naphthas are satisfactory for this purpose. The extracted grains are superior for feeding purposes to the original distillers' grains.

C. A. 32, 1128 (1938).

(69) Boucher, Donald F., Brier, John C., and Osburn, James O., "Extraction of Oil from a Porous Solid." Trans. Am. Inst. Chem. Engrs. 38, 967-93 (1942). - Experimental data were collected on semibatch and continuous countercurrent extractions of porous plates saturated with soybean oil, with perchloroethylene and a carbon tetrachloride-ethylene dichloride mixture as solvents. The liquid-film resistance was found to be negligible as compared with the resistance to diffusion within the solid. The extraction process was found to be one of pure molecular diffusion, the diffusion coefficients being substantially constant for any one temperature and system, independent of liquid concentration, despite the large difference in the solute and solvent viscosities. The diffusion coefficients were correlated as a function of the product of the viscosities of the solute and solvent. Some data were collected on continuous countercurrent extractions of soybean flakes which indicated that the removal of the extractable portion of the oil in the flakes was likewise a process of molecular diffusion.

C. A. 37, 1 (1943).

(70) Boulter, G. S., "Modern Oil-Extraction Plant." Can. Chem. Process Indus. 29, 306-11, 350 (1945). - At the Toronto, Ontario, plant of Victory Mills, Ltd., there is a combination of the screw press and solvent extractor continuous processes. Operations, products, yields, etc., are discussed.

C. A. 39, 3446 (1945).

(71) Boyer, R. A., "Soybean Protein Fibers." Ind. Eng. Chem. 32, 1549-51 (1940). - The experimental production of fibers from soybean protein is described. Emphasis is placed on the necessity of utilizing pure strains of soybeans to obtain proteins of uniform composition. Solutions containing

as much as 20% protein can be prepared, and are aged prior to spinning. Soybean fibers are somewhat weaker than wool fibers but have more elongation in both the wet and dry states. They do not promote mold-growth as readily as casein fibers.

C. A. 35, 901 (1941).

(72) Bradley, I. C., "The Processing Of Soybeans." Proc. 16th Ann. Meeting Am. Soybean Assoc. 1936, 37-9. - Methods of extracting the oil are briefly discussed.

C. A. 31, 4148 (1937).

(73) Bragg, Edward L. and Vilbrandt, Frank C., "Relationship Between Nozzles and Solvent-Solute Characteristics in Solvent Extraction." Proc. Virginia Acad. Sci. 1940-41 in Virginia J. Sci. 2, 206-07 (1941). - Several nozzles were investigated as to drop size, velocity, and stability at varying flow rates for a few commercial solvents.

C. A. 36, 2042 (1942).

(74) Bredemann, G. and Kummer, H., "Influence of Storage of Soybeans on the Yield and Speed of Extraction of Oil and Phosphatides." Fettchem. Umschau 41, 81-5 (1934). - A series of benzine extractions of soybean oil with variations in the storage time of the beans, their H_2O content, and the duration of extraction yielded the following results: benzine extraction of air-dried, ground bean meal decreases the amount of phosphatides with increasing drying time and with elevation of temperature. Storage in a moist and warm hothouse increased the yield of pure oil and decreased the phosphatides; with storage in a cooler, the yield of pure oil and of phosphatides increased slightly. Increasing moisture content in the goods increased the yield, especially of the phosphatides. It is assumed that the free oil within the cell dissolves the free phosphatides which are readily extracted, but that an additional amount of oil and of phosphatides is present in a more or less combined form, which dissolves only on prolonged extraction.

C. A. 28, 4926 (1934).

(75) Brother, G. H. and McKinney, Leonard L., "Protein Plastics from Soybean Products--Action of Hardening or Tanning Agents on Protein Material." Ind. Eng. Chem. 30, 1236-40 (1938). - The previous study (Beckel, Brother, and McKinney) which indicated that added water was not necessary for the plasticization of soybean protein was followed up by studying the action of strong hardening agents (commercially available aldehydes, ketones, Cr and Al sulfates, tannin, and syntan) on soybean proteins. Samples of soybean a-protein were treated with formaldehyde solutions of varying pH values, the hardened material was air-dried and molded into uniform disks and the water absorption of these test pieces determined. The percentage of water absorption was selected as the criterion of the best plastic. The water absorption was found to be least for samples hardened in the isoelectric range of the protein (pH 4.3 for soybean proteins). At either side of this point it increased abruptly. Protein-aldehyde compleses produced in this range are thermoplastic. The aldehydes, especially formaldehyde, were found to be the most effective hardening agents of those studied. Various protein materials (soybean expeller flour, solvent-extracted meal, v- and a-protein, protein-70, rennet and lactic acid casein, and zein) were hardened with formaldehyde and furfural and the comparative water absorption was measured. The formaldehyde-hardened soybean products, except v- and a-protein, disintegrated in water. The corresponding furfural-hardened products

did not. Acid casein gave much better results than rennet casein. Zein was not hardened by either aldehyde.
C. A. 33, 266 (1939).

(76) Brother, G. H. and McKinney, L. L., "Protein Plastic from Soybean Products--Plasticization of Hardened Protein Material." Ind. Eng. Chem. 31, 84-7 (1939). - Polyfunctional alcohols plasticize CH_2O-hardened soybean protein, while monohydric alcohols, ketones, esters, and oils are generally ineffective. Addition of 20% $(CH_2OH)_2$ plasticizes the hardened protein sufficiently for molding, and also renders it slowly thermosetting. The water absorption of the protein is doubled by this amount of glycol. Oleanolic acid and Al stearate reduce the water absorption of the protein glycol plastic.
C. A. 33, 2244 (1939).

(77) Brother, G. H. and McKinney, L. L., "Soybean Proteins as a Possible Base for Plastics." Rev. Gen. Mat. Plastiques 15, 205-08 (1939). - A brief discussion and review, with 15 references.
C. A. 33, 9480 (1939).

(78) Brother, G. H. and McKinney, L. L., "Protein Plastics from Soybean Products. Influence of Phenolic Resins or Phenolic Molding Compounds on Formaldehyde-Hardened Protein Material." Ind. Eng. Chem. 32, 1002-06 (1940). - Thermoplastic CH_2O-hardened soybean meal, by mixture with phenolic resin, is converted to a thermosetting, resinous molding plastic, definitely superior to any previously suggested modified protein plastic, with good possibilities. The 50-50 mixture produces pieces which do not blister under the same conditions required by the phenolic molding compounds alone. The alkali commonly used to catalyze the cure of the phenolic resin appears to weaken the H_2O resistance of the hardened protein. Phenolic resin, CH_2O-hardened soybean meal, and wood flour, 3, 3, 2, produce thermosetting plastics with as fine a finish, as great strength, as short a cure, as permanent as average phenolic plastics, and with greater possibilities for color and shade production. Fifty-one references.
C. A. 34, 5960 (1940).

(79) Brother, G. H., McKinney, L. L., and Suttle, W. C., "Protein Plastics from Soybean Products. Laminated Material." Ind. Eng. Chem. 32, 1646-51 (1940). - A protein laminated plastic material, prepared from unsized kraft paper impregnated with CH_2O-hardened thermoplastic soybean protein salt, compared favorably with similar commercial materials in impact and flexural strength and modulus of elasticity, but not in water resistance. By placing a sheet of phenolic or urea-impregnated paper on each exposed face before pressing, a product resulted with the water resistance and other desirable properties of present commercial products, except for the edges, in materially reduced pressing time. It is proposed to extend this investigation to cellulose fibers before sheeting and to the preparation of fabric-laminated material. Nine references.
C. A. 35, 1541 (1941).

(80) Brown, J. B., "The Structure and Chemical Composition of Fats and Oils." Oil & Soap 15, 102-06 (1938). - A general review is given of the progress during the past 10 years both in the chemistry of the glycerides of fats and oils and in the chemistry and nature of their constituent fat acids. Applications of some of the newer research methods are described and discussed. Bibliography.
C. A. 32, 4812 (1938).

(81) Brown, W. L., "Theonine, Serine, Cystine, and Methionine Content of Peanut Proteins." J. Biol. Chem. 14, 2299-301 (1942). - The quantities of these amino acids in arachin and conarachin, respectively, were: threonine, 2.56 and 2.02%; serine, 5.20 and 4.99; cystine, 1.51 and 2.92; methionine, 0.67 and 2.12.

C. A. 36, 2279 (1942).

(82) Brown, W. L., "Trytophan and Tyrosine Content of Peanut Proteins." J. Biol. Chem. 154, 57-61 (1944). - In the determination of tryptophan (I) by the glyoxylic acid method (C. A. 33, 505), the addition of NO_3^- or NO_2^- ion in amounts greater than 0.005 mg. per 2 ml. was shown to cause serious loss of I. Addition of NH_3 had no effect. Isolated from fresh peanuts, arachin was found to contain 0.68% I and 5.68% tyrosine (II). Conarachin contained 0.91% I and 2.85% II. The total globulin from peanuts contained 0.79% I and 4.80% II. Laboo casein contained 1.03% I and 5.70% II. Comparison of the results of other authors for these determinations is made.

C. A. 38, 5510 (1944).

(83) Bull, W. C. and Hopper, T. H., "The Composition and Yield of Crude Lipids Obtained from Soybeans by Successive Solvent Extractions." Oil and Soap 18, 219-22 (1941). - Bull and Hopper tabulated the properties of the lipids obtained by successive solvent extractions of soybeans. The lipids from the first and sixth extractions varied 17.5 units in iodine number and 23.4% in phospholipids.

O. & S. 19, 47 (1942).

(84) Burnett, R. S. and Fontaine, T. D., "Commercial Peanut Meal--Peptization and Extraction of Nitrogenous Constituents and the Color Comparison of Protein Solutions." Ind. Eng. Chem. 36, 284-88 (1944). - By properly controlling the production of hydraulic-pressed peanut meals, oil can be removed with a minimum change of peptization properties. Data are given to show use of N peptization values of peanut meal as guides to amount of protein which can be separated. Proteins of good color can be obtained from blanched red-skinned and unblanched white-skinned peanuts. Cultivation of the latter for industrial use of protein appears desirable and feasible.

C. A. 38, 3384 (1944).

(85) Burnett, R. S, Roberts, E. J., and Parker, E. D., "Viscosity Patterns of Peanut-Protein Solutions." Ind. Eng. Chem. 37, 276-81 (1945). - Methods for preparing and determining the viscosity of vegetable protein solutions are described. Data are presented showing the influence on the viscosity relations of peanut-protein solutions made alkaline with NaOH, of concentration, heat, time, pH, and other factors which are, in turn, affected by the methods employed in preparing the peanut meal and the separation and subsequent treatment of the protein. A comparison of the viscosity behavior of protein solutions of peanut, casein, soybean, and cottonseed is presented.

C. A. 39, 1706 (1945).

(86) Burnett, R. S., "Peanut Protein Hydrates--Preparation and Properties. Ind. Eng. Chem. 37, 860-63 (1945). - Burnett describes peanut protein hydrates which are capable of binding increasing amounts of H_2O, from 38 to about 70% by weight of the solute, as the pH value of the system is increased from 4.5 to 9.0. H_2O in excess of that bound by the protein results in disintegration of the protein-H_2O system. If the protein is isolated

with a minimum of alteration by heat and alkali, the protein hydrates are tacky and at pH values near neutrality have viscosity characteristics which make them suitable for adhesives. Drying costs in preparing isolated peanut protein are reduced by bringing about a lowering of the H_2O content of the protein material from 70-80 to about 40% by warming until the protein curd particles coalesce and exclude unbound H_2O. Similar soybean protein hydrates can be prepared.

C. A. 39, 4775 (1945).

(87) Burnett, R. S., Parker, E. D., and Roberts, E. J., "Peanut-Protein Hydrates. Utilization as Tacky and Re-moistening Adhesives." Ind. Eng. Chem. 37, 980-82 (1945). - Peanut protein, from both solvent-extracted and pressed peanut meals, has been used to prepare adhesives which are suitable for making gummed paper and tape, and flexible adhesives suitable for use by box makers and bookbinders. By neutralizing the protein curd before drying, readily soluble adhesives can be prepared. Adhesives of relatively uniform ash content are made by dewatering the protein curds to the water content of the hydrate. This also reduces drying costs. The rehydration, tackiness, and flow properties of these peanut-protein adhesives render them suitable for certain purposes for which vegetable proteins have previously been considered unsuitable.

C. A. 39, 5551 (1945).

(88) Burnett, R. S., "Manufacture and Use of Peanut Protein." Chem. Eng. News 24, 478-80 (1946). - Protein, useful in the preparation of tacky and remoistening adhesives, is prepared by alkali extraction of solvent-extracted peanut meal. If hydraulic press-cake is used, it must first be ground and sifted to remove fines, which interfere with clarification. To obtain satisfactory color in the extracted protein it is necessary to employ white-skin peanuts, prior to extraction of the oil, to treat the shelled peanuts with dilute alkali to remove the red color from the skins. To remove color prior to oil extraction the shelled peanuts are treated with 0.5% lye solution at room temperature for about 1 minute and then washed and dried at 50° to approximately 10% moisture content. To extract protein from the solvent-extracted meal 10 parts of water are added to each part of meal, and NaOH is added to adjust the pH to 7.5-8.5. After the mixture is stirred about 30 minutes at 25-30°, the bulk of the meal residue is separated by passing through shaker screens. The liquor is allowed to settle for about 30 minutes and is then filtered with a filter aid. The protein in the filtrate is precipitated by adjusting the pH to 4.5-5.0 with SO_2. It is dewatered and dried at 50°. Protein thus prepared is suitable for spinning fibers. For utilization as tacky and remoistening adhesives the dewatered curd is neutralized to pH 6.0-8.0 and a preservative added. The supernatant liquor from the protein curds after removal of SO_2 is a medium for yeast propagation. About 2 lb. of dry yeast per 100 lb. of peanut meal extracted are obtained from liquor (supplemented with NH_4 salts), with Torulopsis utilis as the propagating organism. The meal after extraction of protein still contains about 40% unextracted protein, and on a protein-content basis is equivalent to the original meal as a feed supplement. A flow sheet is given and processing costs are estimated.

C. A. 40, 2245 (1946).

(89) Burnett, R. S. and Parker, E. D., "Peanut-Meal Plywood Glue." Trans. Am. Soc. Mech. Engrs. 68, 751-56 (1946). - A peanut-meal plywood adhesive mixture has been developed which has good flow properties and which is

accommodated to ordinary glueing schedules for this type of adhesive. Joint tests show that this adhesive meets the requirements established for casein and casein-type adhesives. The formula recommended for preparing plant-scale batches of peanut meal is as follows (ingredients added in order listed): H_2O 200 lb., peanut meal flour (processed for oil removal at relatively low temperature) 100 lb., add flour to H_2O, and stir to a smooth paste. Then add H_2O 55 lb., hydrated lime 15 lb. mixed with 35 lb. H_2O, NaOH 4 lb. dissolved in 11.5 lb. H_2O, tetrasulfide (equal parts of CS_2 and CCl_4) 3 lb. Stir for 2 minutes and add sodium silicate (Philadelphis "N" brand or equal) 15 lb. Stir for a few minutes and use. A spread of about 150 lb. of wet adhesive per 1000 sq. ft., 3-ply basis, and a pressure of 150 lb. per sq. in. are satisfactory. This formula is for hardwood veneer, and it may be necessary to alter the H_2O content for softwood veneers or wet veneers.

C. A. 41, 621 (1947).

-C-

(90) Campbell, J. A., "Distribution Equation." Ind. Eng. Chem. 36, 1158-61 (1944). - The distribution of a substance between 2 phases can be expressed for a great number of systems by plotting log concentrations in one phase against log concentration in the second phase. In most cases straight lines are obtained whose equation is $K = (A_B)^s/(A_C)$, where s is the slope of the curve, which is identical with the Freundlich equation for absorption isotherms. The method is not strictly applicable to cases of extreme dissociation of the solute or the chemical reaction between solute and solvent. However, straight-line segments often can be used in these cases instead of one line covering the entire range. An example is given showing the application of the equation to countercurrent continuous extraction.
C. A. 39, 664 (1945).

(91) Cannen, M. R. and Fenski, M. R., "Lubricating Oils-Solvent Extraction in a Reflux Extraction Unit." Ind. Eng. Chem. 28, 1035-37 (1936). - Solvent extraction with the aid of total reflux of the solvent in a laboratory apparatus described gives as efficient separation with a comparatively poor solvent as extraction without reflux by a more highly selective one.
C. A. 30, 78297 (1936).

(92) Carriere, J. F. (Delft), "Some Five-Liquid Equilibrium Systems." Chem. Weekblad 41, 58 (1945). - New 4-liquid systems reported are: (saturated K_2CO_3 in water + saturated NH_3 in water + concentrated Na oleate in water + aniline, hexane, nitrobenzene, neutral peanut (or olive) oil, or castor oil), (K_2CO_3 solution + NH_3 solution + aniline + hexane or peanut oil), (K_2CO_3 solution + NH_3 solution + hexane + nitrobenzene or castor oil), (K_2CO_3 solution + Na oleate solution + aniline + hexane + nitrobenzene or castor oil). Substitution of toluidine for aniline, of paraffin oil for hexane, and of Rb_2CO_3, Cs_2CO_3, K_3PO_4, or KVO_3 for K_2CO_3 increases the total number of 4-liquid systems to 135 (cf. Janecke, C. A. 26, 5249). Four fundamental 5-liquid systems have been found: (K_2CO_3 solution + NH_3 solution + Na oleate solution + aniline + hexane or peanut oil), (K_2CO_3 solution + NH_3 solution + Na oleate solution + hexane + nitrobenzene or castor oil). By substituting toluidine for aniline, paraffin oil for hexane, and any one of the above 4 salts for K_2CO_3 the total number of systems is increased to 50. Satisfactory quantities of the liquids are 30 ml. of hexane, NH_3, and aniline, 15 ml. of Na oleate and K_2CO_3. The volumes of the phases left in equilibrium at various temperatures were determined. The volume of the Na oleate phase decreases with increasing temperature and the phase disappears at approximately 26°.
C. A. 40, 794 (1946).

(93) Chang, K. C. and Chao, Y. S., "Cottonseeds. IV, Extraction of Cottonseed Protein." J. Chem. Eng. China 4, 173-76 (1937). - 16.7% of protein is extracted from oil-free cottonseed by 10% brine (12 hours) and a further 14.1% is obtained from the residue by extraction with 5% aqueous NaOH.
Br. A. B, 1125 (1937).

(94) Chatterjee, N. G., "Extraction of Castor Seed or Cakes with Industrial Alcohol." J. Indian Chem. Soc., Ind. Ed. 2, 171-77 (1939). - Extraction of

the seed with industrial EtOH followed by separation of the oil by addition of H_2O, is suggested.

O. & S. 17, 268 (1940).

(95) Chatterjee, N. G. and Saxena, R. S., "Extraction of Castor Seed and Cake with Industrial Alcohol." J. Indian Chem. Soc., Ind. Ed. 3, 23-8 (1940). - Extraction of oil from decorticated castor seed and from half-decorticated castor seed with industrial EtOH under various conditions is described. Some extraneous matter is deposited during the concentration of the extract.

O. & S. 17, 268 (1940).

(96) Cherdyntzeff, V. A., "Concerning a Method of Extraction of Soybean Oil by Means of Alcohol." Manchuria Monitor 1927, 3; Seifenseider Ztg. 54, 928-29.

(97) Chernukhin, A., "Oil Extraction with Dichloroethane." Masloboino Zhirovoe Delo 13, No. 3, 7-8 (1937). - Comparative tests in the extraction of oil and press-cake and crushed sunflower seeds, cottonseed and castor beans with benzine, petroleum ether, Et_2O, and $C_2H_4Cl_2$ are described. The best results were obtained with $C_2H_4Cl_2$, giving an extraction residue suitable for animal feeding.

C. A. 31, 8967 (1937).

(98) Chernukhin, A., Gil'man, D., Sumenko, R., and Pchelintseva, V., "Extraction of Castor-Oil Cake with Dichloroethane at the Saratov Plant." Masloboino Zhir. Prom. 16, No 3, 9-10 (1940). - The use of the previous laboratory method (preceding abstract, Ed.'s note) in the factory extraction of castor-bean press-cake with $C_2H_4Cl_6$ gave equally good results. The procedure is described in detail.

C. A. 35, 923 (1941).

(99) Coates, C. E. and Vick, M. M., "Magnolia Seed Oil." Oil and Soap 11, 174-75 (1934). - Oil was extracted from magnolia seeds with CCl_4, but no practical use was found for the product.

M. B.

(100) Colburn, A. P., "The Simplified Calculation of Diffusion Processes. General Consideration of Two-Film Resistances." Trans. Am. Inst. Chem. Engrs. 35, 211-36 (1939). - Heat-transfer, dehumidification, absorption, distillation and extraction operations in general involve 2-film resistances. Where there is direct contact between the 2 fluid streams as in packed or spray columns, the use of an "overall" value of H. T. U. (height of transfer unit) greatly simplifies plus the product of the liquor-film H. T. U. by the ratio of the slope of the equivalent curve to that of the operating line. This ratio is fixed within narrow limits by economic factors so that, as shown by calculated examples for absorption of NH_3, SO_2, and CO_2, the overall H. T. U. and resulting column height do not vary from one of these systems to another as much as might be supposed. Applications are also made to heat transfer, distillation, and extraction.

C. A. 33, 4469 (1939).

(101) Cole, L. U., "Extracting Oil from Cotton Seed." Oil Mill Gaz. 51, No. 1, 16-8 (1946).

(102) Cole, L. U., "Extracting Oil from Cottonseed and Other Oil-Bearing Seeds." Oil Mill Gaz. 51, No. 7, 36-8 (1947). - The various extraction methods are discussed. The expeller method is favored over that of hydraulic systems because of low labor requirements. The solvent system is criticized because of the gossypol problem, production of "fines" in the by-product feed, and cost.

C. A. 41, 2917 (1947).

(103) Cooper, W. F. and Mann, F. H., "Industrial Fire Risks." J. Inst. Elec. Engrs. (London) 91, 267-85 (1944). - A complete and comprehensive exposition is given in Part 1 covering fire-resisting materials, fireproof buildings, and the contents of buildings. Useful tables of flash points of inflammable industrial solvents, spontaneous ignition temperature, and limits of inflammability of a number of substances are included. Other topics discussed are spontaneous combustion, dusts, electrical equipment, insulating oils, cables, earth leakage, and flame-proof construction. Part II deals with specific hazards in, e.g., gas works, oil-refining, hydrogenation, and suggests measures for their reduction. A bibliography and report of subsequent discussion are given.

C. A. 39, 3432 (1945).

(104) Cox, C. H., "Preparation and Analysis of Peanuts." Oil & Soap 20, 213-14 (1943). - The following method is proposed: grind 100 g. of the mixed sample of nuts through a Universal food chopper, using the 12- or 16-tooth blade. Dry duplicate portions of 5-10 g. for 5 hours at 101° in the official forced-draft oven for moisture. Dry 55 g. of the ground nuts for 1 hr. at 130° and when cool weigh 45.0 g. ± 0.1 g. and add 15 ± 0.1 g. of diatomaceous earth and mix in a qt. Mason jar. Allow to stand 1 hr. and grind in a Bauer Bros. No. 148 mill, and mix in a 2-qt. Mason jar. Weigh 2.666 g., wrap in 2 filter papers, and extract 4 hrs. with petroleum ether. Divide the weight of oil extracted by 2 and multiply by 100 for percentage of oil. A second moisture test is made on 2.666 g. for 2 hrs. at 101°. This loss in weight divided by 2 and multiplied by 100 = moisture in the ground material. The calculation to the original basis is the same as for cottonseed. The results by the above method agree with the standard method and the extraction period is less.

C. A. 38, 272 (1944).

(105) Crampton, E. W., "A Soxhlet Type Apparatus for the Simultaneous Extraction of a Large Number of Samples." Sci. Agr. 22, 337-38 (1942). - A single extraction chamber large enough to hold a number of thimbles facilitates obtaining fat free samples. The apparatus is described and figured.

C. A. 36, 4737 (1942).

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(106) D'Aquin, E. L., Spadaro, J. J., Vix, H. L. E., Pominski, J., Molaison, L. J., and Polland, E. F., "Solvent Extraction of Cottonseed and Peanut Oils." Oil Mill Gaz. 51, No. 10, 17-9 (1947). - The experiments were undertaken to obtain information required for the design and operation of pilot-plant equipment and for the development of processes in solvent extraction. Crude cottonseed oils were produced on a pilot-plant scale from a single lot of prime cottonseed by hexane extraction of the cooked and the uncooked meats and by standard hydraulic pressing of the cooked meats. Refining and bleached color tests showed that the crude oil obtained by solvent extraction of either the cooked or uncooked meats with removal of solvent at a temperature below 140° F. compared faborably in quality and grade with the oil prepared by hydraulic pressing. The lightest-bleached oil colors were obtained from the oil produced by solvent extraction of the uncooked meats. The solvent-extracted oils appeared to refine better and still give comparable color and refining tests. The oils produced from the 3 different processings were subjected for 1 hour to heating temperatures from 150 to 240° F. In all cases the bleached oils were darker in color as the heating temperature was raised. The oil extracted from the uncooked meats, although of lighter original bleached color, appeared to degrade in color more rapidly at the 150° F. and 240° F. temperature levels than did the oil extracted from the cooked meats; and its final bleached color was darker after heating at 240° F. The hydraulic-pressed oil was markedly less affected by heating than either of the 2-hexane-extracted oils and did not exhibit a sharp bleached color degradation as did the hexane-extracted oils. It is not known to what extent the darker bleached oil colors which resulted from heating the crude oil can be attributed to actual darkening of the oil in situ during the heating or to fixation of the original pigments. (cont.)

C. A. 41, 3981 (1947).

(107) Das Gupta, S., "Recent Developments in Plastics in India. VIII. (3). Synthetic Fibers from Proteins--Prolons." J. Sci. and Indus. Res. (India) 4, 754 (1946).

(108) Davis, D. S., "Extraction Nomograph for Solute-Free Solvents." Ind. Eng. Chem. 34, 1014 (1942). - A nomograph is set up which enables a rapid determination of the number of cells required in countercurrent extraction under equilibrium conditions.

C. A. 36, 5678 (1942).

(109) De Campos, H. V., "Laboratory Apparatus for the Extraction of Oils by Solvents from Seeds." Chimica Industria 3, 482-84 (1928). - The extraction is continuous. The apparatus consists of a distilling flask, a condenser, a two-neck Woulff bottle with outlet at bottom, and a syphon, leading back to the distilling flask. In the extraction by a hot solvent, the condenser is mounted on the Woulff bottle.

C. A. 22, 4849 (1928).

(110) De Raedt, J., "What is the Most Economical Process for Extracting Oil from Decorticated Cotton Seed?" Mat. Grasses 27, 10671-73 (1935). - From a comparison of the relative costs of (1) discontinuous hydraulic pressing,

2) continuous mechanical pressing, and (3) preliminary continuous pressing ollowed by solvent extraction, it is concluded that (3) is the most econom-cal, particularly under the conditions prevailing in the Argentine Chaco.
O. & S. 13, 129 (1936).

(111) Dollear, F. G., Hoffpauir, C. L., Carroll, L., and Feuge, R. O., "Oil and Meal Yields in Peanut Milling." Oil & Soap 23, 45-8 (1946). - A continuous processing test was made in a commercial oil mill to determine the nature and amount of the so-called "invisible" oil loss which has been reported to occur in milling peanuts. All products entering and leaving the mill were weighed, sampled, and analyzed. The yields of oil and meal were compared with the yields predicted on the basis of chemical analysis. No so-called invisible oil loss was observed.
C. A. 40, 2012 (1946).

(112) Donald, M. B., "Percolation Leaching in Theory and Practice." Trans. Inst. Chem. Eng. 15, 77-109 (1937). - The theory is applied to the beet sugar plant.
C. A. 31, 2475 (1937).

(113) Dorr, J. V. N. and Lasseter, F. P., "Solid-Liquid Separations." Colloid Chemistry 6, 782-99 (1946). - Fundamental considerations (electric charge; influence of electrolytes and stabilizers or protective colloids; flocculation; coagulation; etc.); destabilization and aggregation; subsidence in various types of pulps; various types of apparatus and their uses.
C. A. 40, 2038 (1946).

(114) Dowell, C. T. and Menaul, P., "Nitrogen Distribution of the Proteins Extracted by Dilute Alkali From Pecans, Peanuts, Kafir, and Lucerne." J. Biol. Chem. 46, 437-41 (1921). - The proteins were extracted by dilute alkali (sodium or barium hydroxide) and precipitated by acidification with acetic acid. The nitrogen distribution was then determined by Van Slyke's method. Tables of results are given. From the data obtained it is suggested that extraction of proteins by alkalis prior to analysis by Van Slyke's method may be generally applicable when it is desired to obtain the amino acid composition of foods rather than to isolate individual proteins.
Br. A. I, 644 (1921).

(115) Drew, D. A. and Hixson, A. N., "The Solubility Relations of High-Molecular-Weight Fatty Acids and Their Esters in Propane near the Critical Temperature." Trans. Am. Inst. Chem. Engrs. 40, 675-94 (1944). - The solubility curves for the binary systems of palmitic acid, stearic acid, and cetyl stearate in propane were determined. In all cases, the mixture is completely miscible in all proportions from the m. p. of the fatty acid of ester up to the critical temperature of propane. The critical solution temperature of the system stearic acid-propane is 91.4° C. and occurs at a composition of approximately 24% stearic acid by weight. Similarly the critical solution temperature for palmitic acid and propane is 96.9° C. and occurs at a composition of approximately 20% by weight of palmitic acid. The critical solution temperature for cetyl stearate and propane is 95.2° C. at approximately 19% stearic acid by weight. A comparison of the data for the stearic acid with published data for oleic acid showed that the single double bond has practically no effect on the critical solution temperature with propane. The solubility curves for the ternary system, propane-pal-

mitic acid-stearic acid were determined at 95° C. and 98° C. These data show that within the accuracy of the analysis, number separation of the 2 acids can be obtained with liquid propane; thus there are definite limitations to the use of propane as a selective solvent.

C. A. 39, 1097 (1945).

(116) Dublyanskaya, N., "The Effect of the Production-Process on the Constants of Some Oils." Masloboino Zhirovoe Delo, 1932, No. 1, 65-8. - The oils from perilla, linseed, soybean, sunflower seed, rapeseed, arachis, and castor were prepared by cold-pressing, extraction with Et_2O and benzine, respectively. The constants of the semi-drying oils show only slight variations. The drying oils obtained by extraction have lower I numbers and higher acidity. The physical constants in this group are also affected to some extent by the method of preparation. Castor oil extracted by benzine has a lower saponification number, because of the incomplete solubility of the glycerides of ricinoleic acid in this solvent. All extracted oils were darker than those obtained by cold-pressing.

C. A. 26, 4491 (1932).

-E-

(117) Eddy, C. F., "Solvent Extraction (of Vegetable Oils)." Oil and Fat Ind. 8, 11-3 (1931). - The economics of solvent extraction are discussed in the light of factory experience; for the greatest efficiency plant should be designed and used for one class of raw material only.

Br. A. B, 401 (1931).

(118) Eichberg, J., "Lecithin--Its Manufacture and Use in the Fat and Oil Industry." Oil and Soap 16, 51-4 (1939). - Lecithin, produced economically and on a commercial scale from soybeans, has been on the market in this country only since 1929. The lecithin and associated phosphatides are extracted with a petroleum solvent and separated mechanically from the mass of oil. Special grades may be prepared by subjecting to further solvent purification and fractional crystallization. In the fat and oil industry the properties of lecithin are used to inhibit rancidification and to modify interfacial tension relationships. Various applications are noted as in oleomargarine, shortenings, confections, coatings and icings, vitamin oils, and for industrial purposes.

Author's Summary.

(119) Elgin, J. C., "Graphical Calculation of Leaching Operations. I. The Carrier Solid Is Insoluble." Trans. Am. Inst. Chem. Engrs. 32, 451-71 (1936). - Elgin reviews the earlier work of Hawley, Baker, Hunter and Nash, Evans, and Ravenscroft. To avoid complicating the presentation of the development and application of the graphical method based on the triangular diagram for leaching, it has been assumed that the solubility of the carrier solid in the leaching solvent is negligible. The method is, however, entirely general and can be easily extended without increased complexity to take account of the solubility of the carrier solid where this is appreciable, if data on its solubility in solutions of the solute of varying concentrations are available. C. A. 31, 6060 1937).

(120) Elgin, J. C., "Design and Applications of Liquid-Liquid Extraction." Chem. & Met. Eng. 49, No. 5, 110-16 (1942). - The three stages of operation involved in liquid-liquid extraction, are (1) contacting and mixing the phases, (2) phase separation, and (3) removal and recovery of the solvent from each phase. Equipment required for use of this system in industry is described. C. A. 36, 3707 (1942).

(121) Elgin, J. C., "Solvent Extraction." Ind. Eng. Chem. 38, 26-7, 37-8 (1946).

(122) Evans, T. W., "The Calculation of the Maximum Results Obtainable by Extraction with Immiscible Solvents." J. Chem. Education 13, 536-38 (1936). - Mathematical calculations are discussed for the multiple-contact and counter-current methods of solvent extraction.

M. B.

(123) Evans, T. W., "Calculation of the Limiting Results Obtainable by Extraction with Partially Miscible Solvents." J. Chem. Education 14, 408-12

(1937). - The relationships involved in a ternary system are considered mathematically and graphically; the system H_2O-CH_3COOH-$CHCl_3$ is used to illustrate the graphic method.

C. A. 31, 8339 (1937).

-F-

(124) Faith, W. L., Peterson, W. J., and Smutz, M., "Economic Operation of Batch Extractors." Food Industries 13, No. 10, 43-5 (1941). - The following rule for economic extraction of solids from organic materials in a batch extractor were obtained from this investigation. In the ordinary operation of a pilot-sized plant using Soxhlet extractors, the rate of extraction drops markedly after the 1st 3 or 4 dumps. At this time the solid should be allowed to soak for several hrs. before continuing normal operation. The alternate dumping and soaking should be repeated several times before the solid can safely be considered to be completely extracted. After a soaking period, several dumps are often necessary to wash all of the extract from the solid. A preliminary soaking of the solid overnight is usually advantageous. In those cases where speed of the extraction is most important, the usual pilot-plant Soxhlet extractor may be modified to make it essentially a continuous process with a consequent increase in the rate of extraction. No set of general rules can apply in its entirety to a particular case.

C. A. 36, 3070 (1942).

(125) Fash, R. H., "Specifications for Oil-Extraction Solvents." Oil and Fat Ind. 8, 311-12, 317 (1931). - The amount of extract obtained (e. g., from cottonseed) increases with the temperature of extraction. A solvent of pentane type, containing a minimum of isopentane, isohexane, and hexane initial b. p. between 35° and 40°, at least 95% distilling below 55° and not over 85% below 40°) is preferred. Cottonseed extracted at 80° yielded a solid dark resinous material on re-extraction in the usual manner.

Br. A. B, 894 (1931).

(126) Fisher, G. S., "Determination of Gamma-Tocopherol in Vegetable Oils." Ind. Eng. Chem., Anal. Ed. 17, 224-27 (1945). - It has been demonstrated that β-and γ-tocopherols form red compounds when treated with nitric acid in acetic acid solution, whereas α-tocopherol does not. The red compound from γ-tocopherol has been shown to have spectral absorption indicating its identity with tocopherol red. A colorimetric method of analysis has been developed for γ-tocopherol in the presence of α-tocopherol and has been used to determine the γ-tocopherol content of 13 samples of vegetable oil.

Author's Summary.

(127) Fontaine, T. D. and Burnett, R. S., "Peptization of Nitrogenous Constituents of Solvent-Extracted Peanut Meal." Ind. Eng. Chem. 36, 164-67 (1944). - In the study of the by-products of the peanut-oil industry, peanut meal extracted with petroleum ether, b. 30-60°, was peptized at various pH values with water, HCl, NaOH, and dilute salt solution (0.25, 0.5, and 1.0 N) of the halides, SO_4, HCO_3, H_2PO_4, and acetates of the Na and K, chlorides of Li, Mg, Ba, and Ca, $MgSO_4$ and the Na salts of HPO_4, SO_3, S_2O_3, S_2O_4, S_2O_5, and salicylate. Water (pH 6.6) or HCl at pH 1.5 extracted more than 83% of the total N of the meal, while NaOH at pH 7.17 and 11.28 extracted 92.5 and 98.2% respectively. A minimum range of solubility for the nitrogenous compound of peanut meal was found between pH 3.5 and 5.0. Solution of Ca, Ba, and Mg chlorides peptized 3 times more N at 0.25 N, and 8 times more at 1.0 N salt concentration than did water at the same pH but

in the absence of these salts. Na and K salts are about equal in their peptizing abilities. The amount of N extracted by the halides increased in the order F, Cl, Br, I. The 27 salts investigated offered no advantage over weak alkali (pH 7.2) as to the amount of N brought into solution.

C. A. 38, 1388 (1944).

(128) Fontaine, T. D., Samuels, C., and Irving, G. W., Jr., "Properties of Peanut Meal." Ind. Eng. Chem. 36, 625-27 (1944). - Nitrogenous constituents of white-skin peanuts (Pearl variety) peptize as easily as the common red-skin varieties. Storage for 2 years at room temperature before oil extraction does not affect the peptizability of the nitrogenous fraction of the meal. The critical denaturation temperature, as measured by peptization, is above 118° (dry heat) and above 80° at 100% relative humidity. The data indicate that if more careful temperature and moisture control are instituted in peanut oil mills during processing, oil can be satisfactorily removed with a minimum of protein denaturation.

C. A. 38, 5097 (1944).

(129) Fontaine, T. D., Detwiler, S. B., Jr., and Irving, G. W., Jr., "Improvement in the Color of Peanut and Cottonseed Proteins." Ind. Eng. Chem. 37, 1232-36 (1945). - Through the use of controlled protein extraction and precipitation techniques and by washing the moist precipitates with organic solvent, such as dioxane, acetone, and Me Et ketone, preparations can be obtained from the meals of white-skin and blanched red-skin peanuts, without the use of bleaching agents, which are as light or lighter in color than commercial samples of soybean protein. By similar procedures, there can be obtained from the meal of unblanched red-skin peanuts and cottonseed meal, protein preparations that are very close in color to the range of practical usefulness for the production of adhesives and fibers. The use of heat in drying exerts an inappreciable influence on the color of dried peanut protein. C. A. 40, 654 (1946).

(130) Fontaine, T. D., Irving, G. W., Jr., and Warner, R. C., Electrophoretic Investigation of Peanut Protein. II. Composition of Several Peanut Protein Fractions." Arch. Biochem. 8, 239-49 (1945). - Electrophoretic evidence was obtained that the protein fraction precipitated on the adjustment to pH 4.5 of a slightly alkaline extract from defatted peanut meal contains approximately 99% of the major protein components of the meal, including arachin and conarachin. The precipitate was also found to contain 45% of the minor S-rich protein components of the meal. A fraction precipitated by adjustment of the alkaline extract to pH 6 differed from that obtained at pH 4.5 only in physical properties. A precipitate obtained by adjustment to pH 4.5 after precipitation at pH 5 apparently contained the same components as those obtained at pH 6 and 4.5, but they were present in different proportions.

C. A. 40, 1546 (1946).

(131) Fontaine, T. D, Irving, G. W., Jr., and Markley, K. S., "Peptization of Peanut and Cottonseed Proteins." Ind. Eng. Chem. 38, 658-62 (1946). - The peptization behavior of the proteins of peanut meal (I) and cottonseed meal (II), proteins of the corresponding dialyzed meals, and isolated proteins (III) are compared. For this investigation the oil-free and ground I was extracted with dilute NaOH, the protein in the extract (pH 8) was precipitated at pH 4.5 with HCl, centrifuged, dialyzed through a cellophane membrane against distilled H_2O (4°, 3 days), and dried by lyophilization.

II, NaOH-extracted (pH 11) and precipitated with HCl at pH 4, was treated similarly. The effect of the dialyzable meal constituents (23% of I, 33% of II) upon the extractability of I and II proteins is shown by pH vs. peptization curves. Between pH 0.9 and 4.5 the peptization of protein from the dialyzed meal is increased and between pH 2.5-4.0 is 2-6 times greater than that in the undialyzed protein. The great H_2O-peptizability of I protein may be due to lecithin and other nonproteins. The peptization curve for III approaches the one for dialyzed I between pH 2 and 4, while departing from both the other curves on the alkaline side. This may be due to the partial denaturation of III during the lyophilization process. The results for II protein are similar to I although the shape of the curves differs considerably. It was found that a greater per cent of dialyzed I protein was peptized by HCl and H_2SO_4, between pH 0.5 and the isoelectric zone, than of undialyzed meal protein. While the curve for III approaches the one for the former, both acids were excellent precipitants between 1.0-5.0 N acid concentration. Weaker acids (AcOH or H_3PO_4) in high concentrations are unreliable precipitating agents as a peak of peptization is obtained (with I protein) with the increase of the acid concentration followed by an abrupt decrease and an increase again at the highest acid concentration. II proteins, while behaving similarly in strong acids, show no sharp maximum and minimum in weak acids. $CH_2ClCOOH$ is effective between 1.0-3.0 N, while CCl_3COOH is an effective precipitant between 0.5-2.0 N for I (0.5-1.0 N for II), higher acid concentrations lead to a solubility of as much as 95% protein.

C. A. 40, 4397 (1946).

(132) Fontaine, T. D., Pons, W. A., Jr., and Irving, G. W., Jr., "Protein-Phytic Acid Relationship in Peanuts and Cotton-Seed." J. Biol. Chem. 164, 487-507 (1946). - The solubility of the N and P compounds from oil-free peanut (I), cottonseed (II), and soybean (III) meals in various acid and NaOH solutions was determined for a wide range of pH values. There was evidence of a protein-phytic acid complex (IV) occurring mainly for I at pH 1.5 to 3.5, for II at pH 1.5 to 2.75, and for III at pH 1.5 to 3.85. When I and II were dialyzed, the addition of Na phytate decreased the N solubility between pH 1.5 and 4.0. Thus the natural suppression of solubility of seed-meal proteins that takes place at pH values below their isoelectric points was attributed to the occurrence of phytic acid in the seeds. For both I and II and the proteins isolated from them, the phytic acid ion was displaced from the protein by Cl^- at pH values below 1.5. On the alkaline side of the isoelectric zone, IV become increasingly dissociated resulting in a precipitation of mixed salts of phytic acid at pH greater than 6.5.

C. A. 40, 6564 (1946).

(133) Frampton, V. L. and Giles, F. K., "A Low-Pressure Extraction Apparatus." Ind. Eng. Chem., Anal. Ed. 17, 674 (1945). - A device for extracting oil-seeds or similar materials at low-pressure so that exposure to prolonged heating is avoided is described and a diagram is shown. The oil content is determined by loss in weight of the packet of ground seed rather than by observing the weight of the extracted seed.

C. A. 40, 1 (1946).

(134) Francois, M. T., "The Properties of the Oils of Aleurites and Their Relations to the Preparation Methods Employed." Compt. Rend. 206, 1321-23 (1938). - A comparison of the oils of A. fordii Hemsley (Tung) and A. montana Wilson (Abrasin) extracted by hydraulic pressure (1500 kg.) and by means of petroleum ether shows that all properties of the oils vary accord-

ing to the extraction method. In oil extracted by pressure, which does not represent the total amount of lipides contained in the seed, the d., n, and refractive dispersion are higher and the length of heating necessary for their gelation is shorter than in ether-extracted oil.
C. A. 32, 6888 (1938).

(135) Franz, E., "The Development of Synthetic Protein Fibers and Their Practical Value, with Special Reference to 'Thiozell.' III." Melliand Textilber 22, 372-76 (1941). - Protein fibers take up CH_2O, the terminal NH_2 groups forming Schiff bases and the amino groups forming methylol linkages between chains. Wool also takes up CH_2O and becomes somewhat more stable to the influence of alkalies and absorbs water less readily. The reaction of protein fibers with CH_2O is dependent upon pH value. Casein takes up CS_2 with increase in S content of the former to 2.5% and increase in the tensile strength, tension, and wet-strength characteristics of the fiber.
C. A. 36, 1184 (1942).

(136) Franz, E., "The Development of Synthetic Fibers and Their Practical Value with Special Reference to 'Thiozell.' III." Melliand Textilber 22, 436 (1941). - In addition to HCHO there are many other compounds that produce combinations between the separate protein molecules or block the hydrophile groups. In this way protein fibers are obtained that are superior to fibers made according to previously known methods.
C. A. 37, 2592 (1943).

(137) Franz, E., Riederle, K., Fleischmann, F., and Winkler, W., "Production of Synthetic Fibers from Proteins and Protein-Like Materials. I. Formation of Bridges in Protein Fibers." J. Prakt. Chem. 160, 133-65 (1942). - The differences in the physical characteristics of cellulose and protein synthetic textile fibers are discussed. Interaction of alkaline casein solutions with CS_2, p-benzoquinone, and naphtol AS or other dye leads to the formation of twin-chain polymerides which are linked by bridges. The action of CH_2O on proteins also leads to the formation of bridged-chain structures.
C. A. 37, 5247 (1943).

(138) Freeman, A. F., Pack, F. C., and McKinney, R. S., "Solvents in Extraction of Tung Oil." Ind. Eng. Chem. 35, 1156-59 (1943). - Hexane, petroleum naphthas, cyclohexane, benzene, n-heptane, methylcyclohexane, chloroform, isopropyl ether, and ethyl ether were listed as suitable solvents for extraction of tung oil. This investigation included tests on 33 solvents.
O. & S. 21, 67 (1944).

(139) Freeman, A. F., Pack, F. C., and McKinney, R. S., "Effect of Moisture on Grinding of Tung Kernels and Solvent Extraction of Meal." Oil and Soap 21, 328-37 (1944). - A moisture content of 6-8% was found to be optimum for efficiently comminuting tung kernels in preparation for solvent extraction.
O. & S. 22, 71 (1945).

(140) Freise, F. W., "Paper-Pulp Beater in Oil Manufacture." Chem. App. 20, 125-26 (1933). - Beater engines are employed in the pulping of oil-containing seeds and fibers for oil recovery.
C. A. 28, 2931 (1934).

(141) Fussteig, R., "Treatment of Olive Oil." Mat. Grasses 27, 10619-20 (1935). - Fussteig recommended extraction methods for production of olive oil and showed their advantages over the pressing methods.

O. & S. 14, 61 (1937).

(142) Fylemen, E., "Extraction of Oils and Fats." Time Trade & Eng. Supplement (London) 23, 36 (1928). - A review.-- In the Simon extractor (illustrated), the material to be extracted is placed in cylindrical cages between two end plates and extracted by oil solutions of three different concentrations, finally with pure solvent followed by steaming, all automatic. The time required was 20-25 minutes. A very pure product was obtained at low cost and without skilled supervision.

C. A. 23, 1519 (1929).

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(143) Gallup, Willis D. and Bratzler, John W., "Composition of Several Varieties of Peanut Plants and their Parts in Relation to Feeding Value and Oil Yield. A Preliminary Report." Proc. Oklahoma Acad. Sci. 23, 23-7 (1943). - Proximate analyses of 5 varieties of peanut plants collected about 5 weeks before harvest and again after harvest showed large protein losses from the tops. These losses, amounting to 27-42%, were apparently due to shattering of the leaves. Analyses of 9 varieties of the shelled nuts showed them to contain from 24.9 to 31.00% of protein and from 48.78 to 53.01% of oil (ether extract). The theoretical yield of oil per acre varied from 378.7 to 939.7 lb. per acre. C. A. 38, 1580 (1944).

(144) Gastrock, E. A., The Southern Regional Research Laboratory through the War and Now. U. S. Dept. of Agriculture, Bur. of Agricultural and Industrial Chemistry, AIC-108, 1946. 7 pages.

(145) Gavrilenko, "Continuous Extraction of Sunflower-Seed Meal by the Spray Method. I." Masloboino Zhirovoe Delo 14, No. 1, 17-9 (1938). - The optimum conditions for the extraction of sunflower-seed meal with commercial C_6H_6 in the experimental Il'in apparatus by the belt-and-spray method are discussed. O. & S. 15, 191 (1938).

(146) Geisler, K. W., "Extraction and Refining of Vegetable Oils." Progress Fortschr. Deut. Tech. 8, 441-48 (1943). - This is a comprehensive treatise with illustrations on equipment and machines for pressing, extraction, refining, and hardening. Geisler recommends that with less than 30% oil content, one should solvent-extract directly; with 50-60% oil, one should prepress to yield a residue with about 30% oil. The pressing residue is then solvent-extracted to a 1% oil content. Direct solvent extraction from oil seeds of high oil content yields an extraction residue containing 2-3% oil.

C. A. 39, 3446 (1945).

(147) Gibb, T. R. P., Jr., "A Continuous Extractor Using Hot Solvent." Ind. Eng. Chem., Anal. Ed. 10, 547 (1938). - Apparatus is described for extraction with hot solvent upon several kilograms of tarry material in experiments on the constitution of certain resins.

M. B.

(148) Gil'tan, D., "Extraction of Oil-Bearing Seeds with Dichloroethylene." Pishchevaya Prom. 1, No. 2, 25-6 (1941). - This communication on extraction of seeds with dichloroethylene presents data to demonstrate the potentialities of the solvent in a solvent extraction system. Apparatus for extraction and recovery of solvent is discussed.

C. A. 39, 5515 (1945).

(149) Gnamm, Hellmut, Monograph in the Field of Fat Chemistry. Fourth Edition. 1943. Vol. I. 516 pages. - Vested by Alien Property Custodian and reproduced by J. W. Edwards, Ann Arbor, Mich., 1945.

C. A. 39, 3169 (1945).

(150) Go, Yukiti and Noguti, Zyunzo, "Fiber Structure of Soybean Protein." J. Chem. Soc. Japan 60, 427 (1939). - Soybean proteins have been separated according to Hibino's method (C.A. 28, 6447). Each fraction has been examined for film formation, X-ray structure, and optical anisotropy. Glycinin has been found to form the best film which can be stretched to 7 times its original length. The film property elongated gives the X-ray picture of fiber structure of the β-keratin type. Each fraction manifests optical anisotropy when stretched.

C. A. 35, 5138 (1941).

(151) Gogolev, F., "Electrically-Heated Apparatus for Fat and Oil Soxhlet Extractions." Masloboino Zhir. Delo 4, No. 3, 18-9 (1928). - The usual apparatus is water-jacketed.

Br. A. B, 824 (1928).

(152) Gorbach, G., "Use of Micromethods in the Realm of Fats. III. A Rapid Gravimetric Micromethod for the Determination of the Fat Content of Oil Seeds." Fette u. Seifen 49, 625-28 (1942). - A microextraction apparatus is described.

C. A. 38, 1387 (1944).

(153) Gordon, Jane I., "Arkansas Extraction Plant for the Oil-Milling Industry." Southern Power and Industry 64, No. 1, 55 (1946). - Tests of an Allis-Chalmers semi-works solvent-extraction unit similar in design to their 200-ton unit, have indicated that this can be successfully used in the oil-milling industry with a saving in electrical power requirements and operating personnel. The semi-plant unit was first successfully used in the soybean industry. The extractor or contact chamber is composed of many superimposed glass rings divided by steel partitions. The cottonseed meats are fed into the top and pass through by gravity while the solvent is introduced at the base of the extractor and withdrawn at the top. The oil-solvent mixture discharges into a receiving tank with agitator and is then filtered, pumped through a flash chamber and to a stripping column to remove the last traces of solvent from the oil. The meal passes through a drier to recover the solvent.

C. A. 40, 1331 (1946).

(154) Gordon, J. I., "Solvent Extraction Method Used in the Southern Cotton-Oil Plants." Southern Power and Ind. 65, No. 7, 62-3, 73 (1947). - Several solvent extraction plants for cottonseed oil are being installed at present. The Delta Products Co. is installing a 200-ton capacity counter-current plant to replace hydraulic pressing. A yield of 45 lb. of oil more than the hydraulic press is expected, and only 4 skilled men will be required instead of 32 for the 200-ton daily capacity. The oil is superior to that from the old method, and is acceptable in any way. The residual meal contains less fat than before, but is entirely satisfactory for cattle feed. The plant can be used for other oil-bearing seeds, without change.

C. A. 41, 5325 (1947).

(155) Goss, W. H., "Modern Practice in Solvent Extraction." Chem. & Met. Eng. 48, No. 4, 80-4 (1941). - A general discussion with especial reference to soybean oil. Extraction of peanut press-cakes is practiced extensively in Europe. At Magdeburg, Germany, an extractor processes peanut press-cakes. Also at Bordeau, Marseilles, and Dunkerque, in France, and Baasrade, Belgium.

Technical problems infinitely greater in other oil seeds. Disintegration of flakes and formation of powdery pulp which cannot be handled in ordinary solvent systems. Soybean users use naphtha, a normal hexane fraction, b. p. 146-158° C. Leaves only 0.0004% residue by weight.
C. A. 35, 3840 (1941).

(156) Goss, W. H., "Technological Problems in Processing Soybeans. I. The Continuous Pressing Methods. II. The Solvent Process. III. Solvents for Soybean-Oil Extraction." Soybean Digest 1, No. 8, 2-3; No. 9, 2-3; No. 10, 4-5 (1941). - Processes and methods are described and discussed.
C. A. 36, 1796 (1942).

(157) Goss, W. H., Chemistry and Technology of the Soybean and its Derived Products. II. Processing of Soybeans and Soybean Products. United States Department of Agriculture, Bur. Agr. Chem. and Eng., ACE-142, 1942. 69 pages. - A review of the literature on the methods used in the processing of soybeans, and on the refining operations to which the oil is subjected for the production of edible and drying oils. 207 references.
C. A. 37, 2099 (1943).

(158) Goss, W. H., Fauth Company, Wiesbaden. Off. Pub. Bd., Report, PB 1094, 1945. 8 pages. - This company is an oilseed installation, oil refinery, and sales agent for commercial rights to the patents of the late Phillip L. Fauth. The Fauth system of extraction has not been used in the U. S., and no detailed information about it seems to have been made available previously. The equipment and process are described in some detail. The chief advantage of the Fauth extractor is the low solvent ratio with which it operates.
B. S. I. R. 1, 82 (1946).

(159) Goss, W. H. and Markley, K. S., German Processing of Fats, Oils, and Oilseeds. United States Department of Commerce, Off. Pub. Bd., Rpt., PB 1254, Washington, 1945. 125 pages. - A detailed report of inspection trips to 19 plants engaged in processing fats, oils, and oilseeds in Germany, Denmark, and Holland. Information is given on the various operations conducted at the plants in the production of fatty acids, margarine, vegetable and seed oils. Methods of pressing and extraction and of hydrogenation are also described.
B. S. I. R. 1, 82 (1946).

(160) Goss, W. H., Summary of Field Investigations; Fats, Oils, and Oilseeds. United States Department of Commerce, Off. Pub. Bd., Rpt., PB 1270, Washington, 1945. 24 pages. - A survey resulting from visits to the principal oilseed industries in Germany in order to obtain an accurate over-all summary of German oilseed technology during the past 5 to 10 years. Attention is paid to methods of processing and refining fats and oils, the production of lecithin, margarine, synthetic fats, soaps, soy flour, etc. German suffered severely during the war because of the shortage of fats, and though it was once a leader in the development of oil seed technology, it now lags far behind American methods.
B. S. I. R. 1, 83 (1945).

(161) Goss, W. H., Fats, Oils, and Oilseeds. United Stated Department of Commerce, Off. Pub. Bd., Rpt., PB 1306, Washington, 1945. 23 pages. - Proc-

essing in Germany. A survey of two German oilseed mills--Hansa-Mühle A.-G., Hamburg, and Harburger Oelwerke, Brinchmann und Mergell, Harburg. The first is one of the most famous mills in the world, partly because of its size and partly because it developed the widely used "paternoster" type of extraction apparatus. Report has detailed descriptions of procedures used in both plants for oil extraction from soybeans and other oilseeds; also of phosphatide recovery, refinery of the oil, hydrolysis of fats for production of fatty acids, and other related processes.

B. S. I. R. 1, 82 (1946).

(162) Goss, W. H. and Scull, R. S., Fritz Müller Pressing Factory, Esslingen. Off. Pub. Bd., Report, PB 6658, 1945. 5 pages. - Fritz Müller Pressenfabrik at Esslingen is a producer of continuous presses for processing oilseeds. A direct compression with American presses is not justified, for German expellers are primarily low-pressure machines designed only for forepressing as a preliminary to solvent extraction. This report describes the machinery and contains a table of specifications of the Müller Schneckenpressen.

B. S. I. R. 1, 554 (1946).

(163) Goss, W. H. and Markley, K. S., Germany--Fats, Oils, and Oilseeds--Holtz and Willemsen G. m. b. H. Oil Plant. United States Off. Pub. Bd., Rept., PB 25675, 1945. 7 pages. - Report on investigation for the Food and Agriculture TIIC Committee, prepared by direction of Field Information Agency, Technical (U. S.).

B. A. 9, 28403 (1946).

(164) Goss, W. H. and Markley, K. S., Germany--Fats, Oils, and Oilseeds--J. H. Mohr and Co., Hamburg-Altona. United States Off. Pub. Bd., Rpt., PB 25676, 1945. 7 pages. - Report on investigation for the Food and Agriculture TIIC Subcommittee, prepared by direction of Field Information Agency, Technical (U. S.).

B. A. 9, 28404 (1946).

(165) Goss, W. H., Germany--Fats, Oils, and Oilseeds--Toeppfer's Oil Plant G. m. b. H., Hamburg. United States Off. Pub. Bd., Rpt., PB 25678, 1945. 6 pages. - Report on investigation for the Food and Agriculture TIIC Subcommittee, prepared by direction of Field Information Agency, Technical (U. S.). This Company is an affiliate of the Stettiner Oelwerke in Stettin. The East Asiatic Co., a large Danish trading firm with head offices in Copenhagen, owns 63 per cent of Toeppfer's Oelwerke and of the Stettiner Oelwerke. The two companies specialize in the processing of soybeans for the East Asiatic Co. The expeller mill, extraction plant, and refinery, and the processes used in each, are described. It is equipped to extract 300 to 350 tons of soybeans per day and to refine 40 tons of oil per day, but was idle throughout most of the war.

B. A. 9, 28405 (1946).

(166) Goss, W. H., "Processing Oilseeds and Oils in Germany." Oil and Soap 23, 241-44 (1946). - The Germans remove the oil from soybeans by extraction with solvents. Seeds containing higher percentages of oil than soybeans are usually forepressed and then "finished" by solvent extraction. Equipment and methods employed for pressing, solvent extraction, and phosphatide separation and refining are described. Refining practices were

found to differ greatly from those observed in the United States. The composition of German margarine and reversion of soybean oil are discussed.

M. B.

(167) Goss, W. H., "Solvent Extraction of Oilseeds." Oil and Soap 23, 348-54 (1946); Oil Mill Gaz. 51, No. 3, 29-36 (1946). - The solvent extraction of oilseeds is discussed under the following captions: theory, types of extractors, solvents, solvent recovery, and applications.

C. A. 41, 873 (1947).

(168) Goss, W. H., "Solvent Extraction of Oilseeds." Oil Mill Gaz. 51, No. 7, 11-18 (1947).

(169) Goss, W. H., "Edible Oil Industry in Germany. I." Food Industries 19, No. 2, 108-11, 184-7 (1947). - Although the German oilseed industry, centered in the Hamburg-Harburg area, was the greatest in the world, supplies of edible oils in that country became acutely short during the war. As in the United States, national associations were organized for each type of oilseed industry. In general, soybeans are processed by solvent extraction, and almost all other seeds are forepressed in expellers and subsequently treated with solvents in either batch or continuous extractors. Apparatus and methods used by the Germans for oil extraction and solvent recovery are described. Recovery of lecithin, to be used as an anti-spattering agent in margarine, from crude oil is also an important operation in most German oil mills.

M. B.

(170) Goss, W. H., Solvent Extraction of Oil-Seeds. United States Bureau Agr. and Indus. Chem., North. Region. Res. Lab., Peoria, AIC-135, 1947. 6 pages.

(171) Grace, N. H. and Palmer, J. B., "Oil Concentration by Froth Flotation of Pebble-Milled Seed." Can. J. Research 24F, No. 5, 338-47 (1946). - Froth flotation of water-cooked pebble-milled milkweed seed or mustard screenings yielded 90% of the total oil in the concentrate, which was enriched to twice the oil content of the original seed. Protein and inorganic matter also tended to concentrate in the froth fraction. Optimum conditions for separation required pH values substantially below 7 and pulp densities between 2 and 5%. Iodine numbers of oil and ease of protein peptization differed for concentrate and tailing fractions, showing some fractionation as well as concentration.

Author's Summary.

(172) Grassmann, W., "Protein Fibers." Atti X° Congr. Intern. Chim. 4, 753-54 (1939). - Most protein fibers have many structural modifications. Their molecular orientation can best be determined by X-ray technique. Shrinkage of collagen fibers by heating with water can be measured by X-rays and by enzymatic action. Crude fibers are not attacked by enzymes, while fibers that have been shrunk by exposure to heat are readily digested by enzymes. H^+ ions favor shrinkage while OH^- ions have no effect. Tannins reduce shrinkage and strengthen the fibers. Heat treatment of collagen fibers in stretched condition prevents subsequent shrinkage. Chemical analysis of fibrous proteins point to chain linkages of amino acids

with similar type amino acids recurring frequently. The amino acids of the collagen molecule stand to each other in a simple numerical ratio.
C. A. 34, 3126 (1940).

(173) Green, G. C., "Solvent Extraction. I, II, III." Chem. Age (London) 50, 475-79, 497-501, 519-25 (1944). - A review with 41 references.
C. A. 38, 4155 (1944).

(174) Greenfield, R. E., "Hexane Used as Solvent for Soybean Oil Extraction." Oil Gas J. 44, No. 30, 101-02 (1946). - The extraction of the flaked bean leaves less than 1% of oil in the soybean meal as compared with 4% by pressing. The meal has 44%, or 3% more, protein content.
C. A. 40, 2321 (1946).

(175) Grew, E. S., "Ardil, an Artificial Vegetable Fibre Derived from Peanuts." Illustrated London N. 206, 22 (Jan. 6, 1945).

(176) Guthrie, J. D., Hoffpauir, C. L., Steiner, E. T., and Stansbury, M. F., Survey of the Chemical Composition of Cotton Fibers, Cottonseed, Peanuts, and Sweet Potatoes. A Literature Review. U. S. Dept. Agr., Southern Regional Research Lab., AIC-61, 1944. 86 pages. - A review of data on the chemical composition of cotton fibers, cottonseed, peanuts, and sweet potatoes, together with 67, 91, 92, and 73 references, respectively, to the chemical composition of these commodities.
C. A. 39, 3812 (1945).

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(177) Haller, E., "Peanuts; They Are Playing Major Role in Fight to Lick Fats and Oil Shortage." Wall St. Journal 120, No. 5, 1, 5 (1942). - Because imports of vegetable oils and fats are "out of the window" because of the war, the peanut must be one of our prime sources of vegetable oil. The peanut grower's answer to this--a scheduled 1942 production 133% above the 1941 figure. The industry is hopeful that the end of the war will not see another decline in production and a collapse in normal markets, and cites several new developments in the field which promise sustained production and consumption. Research has developed a satisfactory cloth fabric made from the protein of peanuts, according to W. B. Jester, executive secretary of the National Peanut Council, Inc.

M. B.

(178) Halverson, J. O. and Smith, F. H., "Extraction of Gossypol From Cottonseed Meal. Effect of Moisture and Repeated Extraction with Ether by Different Procedures." Ind. Eng. Chem., Anal. Ed. 6, 356-57 (1934). - Further data are presented confirming the fact that there is no definite limit between the Et_2O-soluble and bound gossypol. Probably the most reliable and practical indication of the Et_2O-soluble gossypol content of cottonseed meal is obtained by extracting the meal containing about 20% H_2O for 72 hours with Et_2O to which water has been added in the receiving flask; however, further extraction under these conditions will probably yield a further slight amount of gossypol.

O. & S. 12, 18 (1935).

(179) Harris, W. D., "Solvent Extraction of Cottonseed Oil." Bull. Texas Agr. Mech. College 12, No. 12, 1-31 (1941). - The subject is discussed under the following captions: present technology, disadvantages of present methods, development of solvent extraction, economic trend in factor of solvent extraction, experimental work at A. & M. College. Two methods for solvent extraction are used, the batch and the continuous countercurrent. In the latter the meals (rolled) are conveyed through a stream of solvent following in the opposite direction. The time of contact is adjusted by varying the solvent and meal rates so that the solvent becomes rich in oil. The usual practice is to have an extraction containing from 20 to 30% of oil and to leave from 0.5 to 1% oil in the meal. The advantages are accurate control of conditions so that the process can be made more nearly automatic and a maximum extraction of oil with a minimum of solvent. Graphs are shown.

C. A. 37, 1285 (1943).

(180) Harris, W. D., "Solvent Extraction of Cottonseed Oil." (Excerpts). Oil Mill Gazetteer 50, No. 5, 14-20 (1945).

(181) Hassel, B., "Operation and Evaluation of Rotating Extraction Apparatus in Practice." Chem.-Ztg. 48, 197-99 (1924). - After several years of practical experience, Hassel finds the rotating extraction apparatus no more expensive and quite as efficient as other types, on all common materials. A typical extraction on 1000 kg. raw material utilizes 2800 kg. steam, 10-12 cu. m. cooling water, 8-10 h. p. hrs., and 8-12 kg. solvent. One man can operate 7 extractors. Counter-current extraction is used in a series of cylinders, with benzene, benzine, or trichloroethylene. The solvent is

removed under vacuum at the end of the process. Use of a filter press can be avoided in many cases by using a suitable fabric over the end of the cylinders.

C. A. 18, 2268 (1924).

(182) Hassel, B., "Extraction of Oils With Solvents in Rotatory Apparatus." Industria Saponiera 24, 159-61 (1924). - The advantages of rotatory extractors are given with a detailed description of their operation with such solvents as C_6H_6 or $CHCl_3$:CCl_2. They are particularly successful with oleaginous seeds. The extracted flour is light in color and almost completely free from oil. They also have proved economical in many other varied uses.

C. A. 18, 3494 (1924).

(183) Hassel, B., "Solvents and Their Proper Use In Oil and Fat Extraction." Seifensieder-Ztg. 56, 370-72 (1929). - CS_2 has been discarded as a solvent for commercial extractions on account of fire hazard and danger to health. Chlorinated hydrocarbons are good solvents, but they extract undesirable resins, albuminoids, coloring matter, and oxidized oils. CCl_4 has lost its value on account of its decomposition into CO_2 and HCl in the presence of H_2O, causing corrosion of apparatus and off-colored products. C_2HCl_3 is the best of chlorinated solvents, but years of experience with it led to its abandonment, because of inferior products and bad effects upon the health of the workers. $C_2H_4Cl_2$ yields better products than C_2HCl_3, but it also affects the health; it does not split off HCl. C_6H_6 is well suited for extraction of castor oil press-cakes, but its vapors cause poisoning. Well purified and odorless petroleum benzine, 42-105° C., is beyond doubt the best solvent for commercial extraction. The ordinary grades require careful purification with 66% H_2SO_4 to remove aromatic hydrocarbons. When thus purified, it extracts only oils and fats, free from impurities, and it may be completely recovered.

C. A. 24, 982 (1930).

(184) Hatt, H. H. and Troyahn, W. J., "The Seed Oil of the Saffron Thistle (Carthamus Lanatus L.)." J. Coun. Sci. Ind. Res. 19, 86-95 (1946). - The seeds of the saffron thistle contain 16% of an oil extractable by petroleum ether. The extracted oil is pale yellow and has the properties of a useful drying oil. It has an I number 138 and a (SCN) number 78-79, and dries to hard pale films. The chief acids present as glycerides are linoleic (70.4%), oleic (12.4%), palmitic (7.5%), and stearic (6.6%). The oil is almost identical with safflower oil.

J. A. O. C. S. 24, 63 (1947).

(185) Hawley, L. F., "Discontinuous Extraction Processes." J. Ind. Eng. Chem. 9, 866-71 (1917). - A mathematical conception of the process of discontinuous extraction has been developed, by means of which the relative yields (total and per unit of solvent) obtained by various methods of extraction are theoretically determinable. This conception, if applicable in practice, will be useful in the study of commercial processes and in the simplification of experimental work on extraction.

C. A. 11, 3098 (1917).

(186) Hawley, L. F., "Numerical Relation Between Cells and Treatments in Extraction Processes." J. Ind. Eng. Chem. 12, 493-96 (1920). - The general

case of the relations existing among the number of cells, number of treatments, amount of time for each operation such as boiling, pumping, charging, etc., is considered at first by cut-and-try methods under varied sets of conditions, and then the mathematical relation is determined by inspection of the above results. A series of formulas for simultaneous pumping, and a second series for separate pumping, are thus obtained. The former series is applicable also to continuous extraction processes. Such formulas make it possible to determine the number of separate cells or extractions required to furnish a certain number of treatments or extractions for each charge, when the time required for each of the various operations is known. The formulas show time relations for simultaneous pumping are but slightly more advantageous than those for separate pumping. Numerical illustrations are appended.

C. A. 14, 2054 (1920).

(187) Hayward, J. W., Steenbock, H., and Bohstedt, G., "Soybean Oil Meal Processing." Flour and Feed 41, No. 4, 24 (n. d.).

(188) Hayward, J. W., Steenbock, H., and Bohstedt, G., "Effect of Heat as Used in the Extraction of Soybean Oil upon the Nutritive Value of the Protein of Soybean Oil." J. Nutrition 11, 219-34 (1936). - Raw soybeans contained protein of low nutritive value as determined by the g. of protein eaten. Commercial soybean meals of the expeller type, processed at 105° for 2 hrs., of hydraulic meal cooked at 82° for 90 minutes contained proteins similar in nutritive value to the raw soybeans. Commercial soybean meals prepared at higher temperatures contained proteins which had about twice the nutritive value of the raw or low-temperature meals. The palatability of raw and heated meals was the same for rats, but the former as well as low-temperature meals were lacking in some growth factor. When casein was added to the raw soybeans, normal growth in rats resulted. Heating the raw soybean meal to a high temperature in the expeller method of oil extraction caused an increase in the digestibility and biological value of the protein. The digestibility increased only 3% while the biological value increased about 12%. This increase in biological or nutritive value of the protein established by metabolism tests agreed with the increase in nutritive value as determined by the growth experiments. The possibility appears that heat causes some essential protein fraction which is unavailable in the raw soybean to become available for absorption and metabolic use.

C. A. 30, 6042 (1936).

(189) Hayward, J. W., "The Nutritive Value of Soybean Oil Meal Prepared by the Different Methods of Oil Extraction." Oil and Soap 14, 317-21 (1937); Poultry Sci. 16, 3-14 (1937). - The author reported optimum temperature treatment before and during the extraction for the production of the best quality soybean oil meal. High temperature expressing, i.e., 140 to 150° C. for 2.5 minutes during expelling, or cooking at 140 to 150° for 90 minutes for hydraulic press and solvent extraction yielded good results.

O. & S. 15, 92 (1938).

(190) Hayward, J. W., Steenbock, H., and Bohstedt, G., "The Proteins of Soybeans and Soybean Oil Meal", in The Composition and Nutritive Properties Of Soybeans and Soybean Oil Meal. A Literature Review. Soybean Nutritional Research Council, 1938. Pages 12-21.

(191) Hefter, G. and Schonfeld, H., Chemistry and Technology of Fats and Fatty Products. Second Edition. Vienna: Springer, 1936-39. Volume I. The Chemistry and Extraction of Fats. 917 pages. Volume II. The Manufacture and Utilization of Fats. 885 pages. Volume III. Soaps and Saponaceous Matter. 610 pages.

(192) Hendix, W. E., Butler, C. P., and Goodman, K. V. Peanut-Production Possibilities in Georgia. Ga. Agr. Expt. Sta., Quart. Bull. No. 228, 1943. 27 pages. - General information including a list of soil types and series suitable for peanut production in Georgia.
C. A. 38, 6468 (1944).

(193) Henk, H. J., "Fibers from Proteins." Kunstseide u. Zellwolle 19, 6-8 (1937). - Henk reviews and discusses the manufacture of synthetic fibers from proteins. Because of the necessity for excluding numerous proteins which have nutrition value, the impossibility of providing sufficient amounts of other types of proteins, and the still existing uncertainty as to the constitution, he considers it doubtful whether they will play an important role in the production of artificial fibers.
C. A. 31, 3688 (1937).

(194) Herm, "The Extraction of Ground-Up Parts of Plants and the Basis for Their Manufacture, Development, and Planning." Zuckerindustrie 1, No. 1, 4-5 (1943). - Extraction process in obtaining products from plants, such as sugar from sugar beets and oil from oilseeds.

(195) Heublum, R., "Extraction of Oil from Maize Germs by Pressing and by Extraction." Seifensieder-Ztg. 61, 638-40 (1934). - Various processes are discussed, the best being warm pressing and extraction with warm petroleum (b. p. 70-80°). The properties of the oils so obtained are compared. The product must be refined, otherwise it rapidly becomes rancid.
Br. A. B, 639 (1935).

(196) Heublum, R., "Extraction (of Oil Seeds) in (Russian) Practice." Allgem. Oel- u. Fett-Ztg. 32, 353-58 (1935). - Works, figures for, quantities, times, etc., illustrate a discussion of Russian technical practice in the extraction (with light petroleum) of cottonseed, etc.
Br. A. B, 1054 (1935).

(197) Heublum, R. and Japhe, H., "Modern Oil Extracting (Processes) and Their Bases." Allgem. Oel- u. Fett-Ztg. 32, 401-05, 447-52, 497-502 (1935); 33, 13-7, 49-55, 96-103, 141-49, 199-203, 254-61 (1936). - Physical structure of seed, change in seed protein on cooking, and effect of various factors (i. e., heat, moisture, pH, etc.) on extraction are reviewed. Bibliography of 109 references.
O. & S. 13, 236 (1936).

(198) Higgins, B. B., Holley, K. T., Pickett, T. A., and Wheeler, C. D. Peanut Breeding and Characteristics of Some New Strains. Georgia Agr. Expt. Sta. Bulletin No. 213, 1941. Pages 3-11. - The chemical composition of 26 new strains of peanuts is given in detail, including the oil constants. The oil content varied from 43 to 52%; the I number of the oil from 87 to 98;

the thiocyanogen number from 65 to 72; linoleic acid from 21 to 34%; acid value of the oil 0.2 to 9.6; total sugars as dextrose 3.5 to 6.5%; lecithin from 0.29 to 0.62%; phytin from 1.25 to 1.52, and Ca from 0.03 to 0.06%. The genetic compound of the strain of peanut materially influences the chemical compound. While the physical constants of the oil from different strains showed considerable variation, these variations are well within the normal limits for peanut oil. C. A. 36, 4213 (1942).

(199) Higgins, B. B., Holley, K. T., Pickett, T. A., and Wheeler, C. D. Peptization of Peanut Proteins. Georgia Agr. Expt. Sta. Bulletin No. 213, 1941. Pages 14-18. - The peanut proteins can be dispersed with water as well as by neutral salt solutions. There is no correlation between the amount of N dispersed and the conductivity of the dispersion. Similarly, there is no correlation between the dispersed N and the pH of the dispersion nor with the lecithin content of the peanuts. Approximately 90 to 95% of the N in peanut meal is present as protein N. 13 references.

C. A. 36, 4213 (1942).

(200) Hildebrandt, K., "The Continuous Extraction of Seeds and Suitable Apparatus." Fette u. Seifen 46, 350-52 (1939). - This lecture discusses problems involved in (1) extracting from crushed oil seeds as much oil as is economically feasible, (2) recovering solvents in oil-extraction plants, and (3) freeing the extracted seed pulps of residual solvent.

C. A. 34, 653 (1940).

(201) Hirst, E. L. and Jones J. K. N., "Pectic Substances. I. The Araban and Pectic Acid of the Peanut." J. Chem. Soc. 1938, 496-505. - Peanuts (Arachis hypogaea) were freed from oil by pressing and extraction with boiling EtOH and from protein with 10% NaCl; they were then extracted with boiling 0.2% aqueous KOH for 4 hrs. and the extract precipitated with MeOH, giving from 6 kg. seeds 77 g. of an araban-pectic acid complex (I). Extraction of the residue with boiling 5% KOH gives 75 g. starch fraction, and leaves about 200 g. cellulose. I is a white powder, which is soluble in dilute alkali, giving viscous solutions. It gives no color with I or with ZnClI. Hot concentrated alkali causes decomposition, with formation of deep orange products. I has $[\alpha]_D^{20}$ 120° (neutral Na salt in H_2O, c 1.5): furfural yield 31.7%; uronic acid content 45.8%; thus the calculated araban (II) content is 40.5%. Hydrolysis of I by boiling an aqueous solution for 20 hrs. gives 33% of a Ba polygalacturonate and l-arabinose, the yield of the diphenylhydrozone of which corresponds to 40% II. Hydrolysis of I with 1% HCl at 90° for 3 hrs. gives a pectic acid, $[\alpha]_D^{20}$ 224° (Na salt in H_2O). Total hydrolysis with 3% H_2SO_4 at 90° for 30 hrs. gives arabinose corresponding to 40% II and galacturonic acid. Part of the II can be isolated by extracting I with 70% EtOH at 20°. Methylation of I could not be effected by the usual methods. However, the Tl derivative reacts with MeI; the methylated product was separated into 2 fractions by Et_2O; the Et_2O-insoluble fraction was further methylated with MeI and Ag_2O and fractionally precipitated from $CHCl_3$ by petroleum ether; further methylation and extraction with Me_2CO gives a methylated II and a methylated pectic acid (to be described later). The methylated II (3.2 g. from 6 kg. seeds) is cream-colored, $[\alpha]_D^{20}$-90° (MeOH, c 1.76). Hydrolysis with MeOH-HCl gives approximately equimolecular proportions of 2, 3, 5-trimethyl- (III), 2, 3-dimethyl- (IV), and 3-methyl-methyl-l-arabinoside (V). III $b_{0.001}$ 87-90°, $n_D^{16.5}$

1.4362, $[\alpha]_D^{21}$ 60° (H_2O, *c* 0.6); the structure of III follows from the con-ersion into 2, 3, 5-trimethyl-*l*-arabinose, 2, 3, 5-trimethyl-γ-l-arabono-actone, and 2, 3, 5-trimethyl-*l*-arabonamide. IV $b_{0.01}$ 115-22°, $n_D^{16.5}$ 1.4522, $[\alpha]_D^{21}$ 14° (H_2O, *c* 0.4); hydrolysis with 0.1 N. HCl gives *2, 3-di-ethyl-l-arabinose*, n_D^{17} 1.4650, $[\alpha]_D^{20}$ 106° (equilibrium value, H_2O, *c* .4); Br-H_2O gives *2, 3-dimethyl-γ-l-arabonolacton*, $b_{0.003}$ 145-55°, n_D^{17} 1.4605, $[\alpha]_D^{20}$-34° (H_2O, *c* 0.7), changing to -19° in 330 hrs.; *amide*, m. 16°, $[\alpha]_D^{20}$ 17° (H_2O, *c* 2). V has n_D^{16} 1.4710, $[\alpha]_D^{21}$ 46° (H_2O, *c* 0.47); hydrolysis gives *3-methyl-l-arabinose*, n_D^{16} 1.4850, $[\alpha]_D^{20}$ 96° (equilibrium value, H_2O, *c* 2.3); oxidation gives the *lactone*, $b_{0.003}$ 175°, n_D^{17} 1.4800, $[\alpha]_D^{20}$-36° (H_2O), changing to -19° in 160 hrs.; *amide*, glassy solid, $[\alpha]_D^{20}$ 31° (H_2O, *c* 1.1). The structure of II is discussed.

C. A. 32, 5382 (1938).

(202) Hixson, A. W. and Bockelmann, J. B., "Liquid-Liquid Extraction Employing Solvents in the Region of Their Critical Temperatures." *Trans. Am. Inst. Chem. Engrs. 38*, 891-930 (1942). - This investigation was undertaken to continue in another direction the work of Hixson and Hixson (Diss., A. N. Hixson, 1941). The study is concerned with liquefied, normally gaseous solvents at temperatures in the neighborhood of their critical temperatures. It was found that certain substances when used as solutes with these solvents undergo a rapid decrease in mutual solubility with the solvent in this region of temperature. The mutual solubility decreases until the solution becomes saturated with solute, then the separation of a second liquid phase occurs. Of the various solutes and solvents which form solutions exhibiting this phenomenon, the binary systems of several pure triglycerides and pure acids (*loc. cit.*) with liquid propane were studied intensively. These solubility measurements together with those obtained in an exploratory solubility survey enabled the authors to make several generalizations with regard to the influence of structure of the solutes on their solubilities. The practical aspect of the investigation was concerned with an extensive study of the system: liquid propane-oleic acid-refined cottonseed oil. It was shown that oleic acid can be extracted from a vegetable oil-oleic acid mixture with liquid propane as the solvent. By means of the data for this system, as determined at 85° C. and 98.5° C., it was demonstrated that they form the basis of a new liquid-liquid extraction process for the refining of crude, long-chain fatty acids. The advantage of this process would be greater product recovery efficiency over the present vacuum distillation refining methods. There would also be no loss of glycerides such as now occurs in the "still" bottoms, and the yield of glycerol would be increased since the glycerides recovered in the new process can be returned to the "splitting" operation. The precision of the data allows their use as a guide for determining in a simple manner the performance of liquid propane solvent extraction equipment. The lubricating oil refiners did not have until now a system as precisely known as the present one. The methods used and the results obtained in the course of this study indicate that this

class of solvents will be of use in the solution of many other problems involving the separation or refining of complex mixtures of natural products.
C. A. 37, 2 (1943).

(203) Hoffpauir, C. L. and Guthrie, J. D., "Chemical Composition of Peanuts. A Literature Review." Peanut Jour. and Nut World 24, No. 6, 26-30 (1945). - The literature on the composition of peanuts is reviewed in detail. The review shows primarily that knowledge of the composition of the peanut is, so far, inadequate. A table is given indicating the amount of investigation which various constituents of the peanut kernel have received. Also tabulated are various analyses of peanut kernels, as well as some analyses of peanut hulls, as reported by a number of investigators.
S. R. R. L. 1945.

(204) Hoffpauir, C. L., "Determination of Moisture in Peanut Kernels." Oil & Soap 22, 283-86 (1945). - Losses in weight of whole and ground peanut kernels were studied in vacuum and forced-draft ovens at 130° and 101°. Under vacuum at high temperatures material other than moisture is lost with little change in the properties of the oil. The quality of moisture in peanuts has little effect on the time required to attain a constant dehydration level. Fineness of grinding increases the initial rate of loss. Losses in weight of 5-g. and 50-g. samples ground in a food grinder with a 19-tooth plate and 50-g. samples of whole kernels in fresh condition after 5 hrs. at 130° in a forced-draft oven show excellent agreement. This indicated that original moisture should be determined on whole kernels and 2nd moisture on 19-tooth ground kernels by heating for 5 hrs. in a forced-draft oven at 130°. Some of the results indicate that in the 2nd moisture determination heating for 3 hrs. might be adequate. The shorter heating would reduce oxidative decomposition. The procedures provide drying conditions that reduce the 1st and 2nd moistures to a basis of equal dehydration of the sample material.
C. A. 40, 6849 (1946).

(205) Hoffpauir, C. L. and Petty, D. H., "Determination of Moisture in Cottonseed and Cottonseed Products." Oil & Soap 23, 285-88 (1946). - Losses in weight of whole, crimped, fumed, and ground cottonseed, whole and ground cottonseed meats, and meal were studied in both vacuum and forced-draft ovens at 101° and in forced-draft ovens at 130°. The values obtained were compared with moisture values by the Karl-Fischer method (cf. C. A. 29, 6532). The amount of moisture in a sample has little influence on the time required to attain a constant dehydration level for the conditions studied. With whole cottonseed 12 to 16 hrs. drying at 101° in the forced-draft oven was found satisfactory. With crimped seed 8 hrs. at 101° was necessary to attain an equivalent degree of dehydration. Values about 0.2% lower were obtained in the 5 hrs. specified in the official method. For fumed and ground cottonseed, whole or ground meats, and cottonseed meal, 5 hrs. at 101° are necessary to reduce the rate of loss to a minimum. This time interval, confirmed by the Karl-Fischer method is longer than the time specified in the official method, i. e., 2 hrs. for fumed and ground cottonseed, and 3 hrs. for meal and meats. On heating cottonseed materials in forced-draft ovens, larger losses in weight are obtained at 130° than at 101°. Both the vacuum and forced-draft ovens reduce cottonseed materials to equivalent degrees of dehydration; the time required is different.
C. A. 40, 6848 (1946).

(206) Holcomb, D. E., "Thermodynamic Properties of Light Hydrocarbons." Ind. Eng. Chem. 36, 384 (1944). - Enthalpy charts were recalculated to correct

for errors in the latent heats of the hydrocarbons, ethane to octane, at 32° F. and zero pressure absolute. The method of computing the latent heats of evaporation at the specified conditions is given.

C. A. 38, 2262 (1944).

(207) Holman, R. L., "Test Tube Triumphs with the Peanut." Forbes 54, No. 8, 18, 20 (1944).

(208) Holmes, F. E., "Apparatus for Extraction of Solids by Upward Flow of Solvent." Ind. Eng. Chem., Anal. Ed. 7, 75-6 (1935). - An extraction apparatus is described which causes the solvent to flow upward through the solid to obviate the stoppage encountered with downward flow.

C. A. 29, 4637 (1935).

(209) Holmes, R. L. and Pack, F. C., The Applicability of Continuous Solvent Extraction to Tung Oil. United States Bur. Agr. and Indus. Chem. AIC-116, Bogalusa, La., 1946. 16 pages.

(210) Horvath, A. A., "Continuous Extractors for Soybean Oil." Oil, Paint and Drug Rep. 127, No. 16, 33, 51 (1935). - The Bollman, Bohm, and Ford extraction systems are briefly discussed with diagrams.

C. A. 29, 4196 (1935).

(211) Horvath, A. A., "Newer Methods of Refining Soya Oil Preserve Its Food Value." Food Industries 7, 387-88 (1935). - Böhm system of countercurrent extraction is described.

O. & S. 13, 91 (1936).

(212) Horvath, A. A., "Chemistry of Soybean Protein Extraction." Soc. Chem. Ind. J. 56, No. 33 735-38 (1937). - It is shown that chemistry of soybean protein extraction is complex and study of solvent extraction of oil and phosphatides from beans, coupled with subsequent separation of protein from soybean meal, is urgent. Bibliography.

E. I. 1937, 1219.

(213) Horwitz-Wlassawa, L. M. and Nowotelnow, N. W., Allgem. Oel- u. Fette-Ztg. 32, 315-21 (1935). - The authors have investigated the Beckmann biochemical method for the possibility of improving it for those materials for which it can be used and for extending its use to other materials. They found that by the method 88.2, 79.8, 78.2, 16.5, and 16% of oil were extracted from copra seed, walnut, cedar nut, pistachio nut, and sunflower seed, respectively. From other seeds, i.e., hemp, castor bean, cotton, apricot kernel, corn germ, etc., no oil was extracted. The addition of glucose improved the extraction only in the case of sunflower seeds and apricot kernels, which yielded 55 and 25.9%, respectively, of their total oil; all other modifications gave negative results. The oil extracted by the Beckmann method has a higher acid and a lower iodine value than the ether-extracted oil from the same seed. O. & S. 13, 91 (1936).

(214) Hossfeld, R., "Continuous Liquid Extractor for Large Volumes of Solution." Ind. Eng. Chem., Anal. Ed. 14, 118 (1942). - A continuous extractor

is described consisting of the conventional boiling flask, reflux condenser, and extraction vessel connected to the boiling flask by means of an overflow. The upper layer of solvent is passed through the solution by means of a hollow shaft pump with inlet at the level of the upper layer.
C. A. 36, 2182 (1942).

(215) Hove, E. L., Carpenter, L. E., and Harrel, C. G., "The Nutritive Quality of Some Plant Proteins and the Supplemental Effect of Some Protein Concentrates on Patent Flour and Whole Wheat." Cereal Chem. 22, 287-95 (1945). - A single sample each of commercial, blended hard spring wheat and the milling fractions were assayed for protein quality by the rat-growth method with ad lib. feeding. The protein efficiency values for the whole wheat, germ, bran, shorts, red dog, 2nd clear, 1st clear, and patent flour were 1.40, 2.87, 21.15, 2.45, 2.06, 1.20, 0.83, and 0.84, respectively. Commercial feed samples of corn oil meal, corn gluten meal, cottonseed meal, linseed meal, soybean oil meal, low-fat wheat germ, and peanut meal and hulls were assayed for protein quality. The wheat germ, shorts, corn oil meal, bran, and soybean oil meal were found to contain high quality protein. Patent flour was supplemented at various levels with soybean oil meal, corn oil meal, nonfat dry-milk solids, and low-fat wheat germ. Soybean oil meal exhibited a marked supplemental effect while the latter three were about equal in their supplemental value. Six per cent nonfat dry-milk solids added to white flour resulted in a protein efficiency value only slightly lower than the value for whole wheat. Whole wheat was supplemented at various levels with soybean oil meal, corn oil meal, and a mixture of them. Soybean oil meal and whole wheat showed mutual supplementation in that mixtures possessed better nutritive quality than either component alone.
C. A. 39, 4361 (1945).

(216) Howard, L. B. Some Trends in the Cottonseed Crushing Industry. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, AIC-118, 1946. 8 pages. - An entirely new method for the solvent extraction of cottonseeds has advanced to pilot plant testing at the U. S. D. A. Southern Regional Research Laboratory. In the process, the flaked cottonseed meats were violently agitated in a special mixture of chlorinated and unchlorinated solvents, adjusted so that the mixture finally separated into three fractions, the pigment glands floated to the top, the meats settled, and the oil remained dissolved in the solvent as an intermediate phase. The method was applicable for the preparation of pigment glands and pigment-free oil and meal from cottonseed.
O. & S. 24, 119 (1947).

(217) Hunter, T. G. and Nash, A. W., "The Application of Physicochemical Principles to the Design of Liquid-Liquid Contact Equipment. II. Application of Phase-Rule Graphical Methods." J. Soc. Chem. Ind. 53, 95-102T (1934). - The previous methods (C. A. 26, 5456) are supplemented by a consideration of the triangular equilibrium diagram for the case where the two solvents are mutually soluble to a limited extent.
C. A. 28, 4273 (1934).

(218) Hunter, T. G. and Nash, A. W., "Liquid-Liquid Extraction Systems." Ind. Eng. Chem. 27, 836-45 (1935). - Multiple and countercurrent contact extraction methods and computations for liquid-liquid systems are described. A graphical method, employing triangular coordinates, for representing equilibrium in complex oil-solvent systems is developed as a basis of com-

putation for the solvent refining of oils. Calculated results checked against data on extraction of lubricating oil stocks refined with nitrobenzene showed good agreement.

C. A. 29, 5311 (1935).

(219) Hunter, T. G. and Nash, A. W., "Chemical-Engineering Design for Solvent-Extraction Units for Refining Lubricating Oil." Chem. Eng. Congr. World Power Conf., Advance proof. C18, 27 pages (1936). - Equilibrium in a complex hydrocarbon-solvent system is described by means of triangular coordinates representing (1) the amounts of the 2 phases in equilibrium, (2) the amount of solvents in each phase at equilibrium, and (3) the viscosity-gravity constant of the oil in each phase at equilibrium. From the resulting diagram, yields, properties of the extracted oil, and the number of extraction stages necessary can be computed. An efficiency factor corrects for the departure from equilibrium at each stage. The efficiencies of mechanical agitators, countercurrent contacting columns, jet contactors, and countercurrent columns are compared. It is shown that high efficiencies are obtained in mechanical agitators, wherein continuous counterflow of the 2 liquids takes place actually in the agitator, give the higher extraction efficiencies.

C. A. 31, 4481 (1937).

(220) Hunter, T. G., "Mixed-Solvent Extraction. Batch-Extraction Stoichiometric Computations." Ind. Eng. Chem. 34, 963-70 (1942). - A graphic method of determining the composition of the 2 liquid phases resulting from a mixture of 4 liquid components, only one of whose 6 binary mixtures is partially miscible and whose liquid-liquid equilibrium surface is a frustum, uses a tetrahedron model and its projections. The example treated is the system $CHCl_2$-H_2O-Me_2CO-AcOH.

C. A. 36, 5678 (1942).

(221) Igarashi, S. and Ishida, Y., "The Influence of Addition Agents in the Extraction of Soybean Oil with Alcohol." J. Soc. Chem. Ind., Japan 40, 271-72 (Suppl. Binding) (1937). - Four kg. of dry beans containing 3-5% H_2O were used in extraction tests of 2 hrs. with 20 l. of alcohol. The following table gives the results, all of which show favorable effects of the addition agents.

Addn. agent	Percentage added to alc.	Percentage of oil left in cake as dry matter	Cc. of oil sepd. in separator
0	0.0	6.74	330
NaCl	0.1	5.26	420
NaCl	0.15	5.62	425
AcONa	0.15	5.40	410
AcONa	0.20	5.66	390
$Ca(C_2H_3O_2)_2(AcO)_2Ca$	0.05	5.88	425
$(AcO)_2Ca$	0.10	5.48	420
$(AcO)_2Ca$	0.20	6.06	455
$C_2H_4O_2$	0.05	5.14	455
NaOH	0.04	5.24	405
NaOH	0.08	5.24	375
NaOH	0.16	5.35	390
$Ca(OH)_2$	0.10	5.88	400
$CaCl_2$	0.10	5.42	460
Soybean oil fatty acid	0.10	5.56	410
Na soap of soybean oil	0.10	5.44	455
Ca soap of soybean oil	0.10	5.30	410
Mg soap of soybean oil	0.10	5.20	430

C. A. 31, 7684 (1937).

(222) Il'in, S., "Extraction of Cottonseed Meal." Masloboino Zhir. Delo 14, No. 3, 5-8 (1938). - A procedure for the continuous extraction of crushed seeds by the combined action of solvent spray and vapors in a special extractor is tentatively discussed. A rapid and uniform circulation of solvent through the separate layers of meal is easily effected. The extraction of oil from the unruptured cell in the meal by diffusion proceeds normally because of the elimination of the "dead spots" in the circulation of the solvent, commonly occurring in the usual extraction apparatus. In the laboratory experiments the extraction time was reduced from 2.5 hours to 40.8 minutes. The residual oil content in the press-cake can be reduced to 10% or less if the crude meal is treated first with live steam for 15-20 minutes and then dried or pressed slightly in a fore-press.

C. A. 32, 8177 (1938).

(223) Inuma, T. and Mashino, M., "Properties of Soybean Protein. I. The Influence of the Preceding Treatments on the Solubilities of the Protein." J. Soc. Chem. Ind., Japan 36, 310-11 (Suppl. Binding) (1933). - Solubilities in H_2O, 1% NaOH, 10% NaCl, 30% $CaCl_2$, and 30% $Ca(SCN)_2$ are tabulated against those obtained after previous treatment with C_6H_6, C_6H_6 followed by MeOH, azeotropic mixture of C_6H_6 and MeOH, and heating at 120° C. The last had the greatest effect.

C. A. 27, 4550 (1933).

(224) Irving, G. W., Jr. and Fontaine, T. D., "Purification and Properties of a Newly Discovered Proteolytic Enzyme of the Peanut." Arch. Biochem. 6, 351-64 (1945). - A purified solution of the new proteolytic enzyme, arachain, found in peanut meal, was prepared having a potency approximately 20 times that of peanut meal. It was found that the common substances employed in the activation of most enzymes had no effect on the hydrolytic action of this enzyme on benzoyl-l-argininamide. The process of enzymatic hydrolysis seemed to proceed in two steps: (1) a reaction of zero order, (2) a supposedly unimolecular reaction. The reactions of all other proteolytic enzymes are of the 1st order. Enzyme activity decreases quite rapidly at 40° and appreciably at 30°.

C. A. 39, 5255 (1945).

(225) Irving, G. W., Jr., Fontaine, T. D., and Warner, R. C., "Electrophoretic Investigation of Peanut Proteins. I. Peanut-Meal Extract, Arachin, and Conarachin." Arch. Biochem. 7, 475-89 (1945). - The homogeneity of peanut proteins and of arachin and conarachin was studied by electrophoretic investigation. Peanuts contain at least 3 protein components; 2 major components are present in an approximate 7:1 ratio and totaling 87% of the protein content and two minor components contained in equal amounts. Arachin and conarachin were isolated from a NaCl solution of peanut meal by controlled precipitation with $(NH_4)_2SO_4$. Arachin comprises 63% of the peanut protein and consists of both major components. Conarachin comprises 33% of the total protein and contains 80% of the major component A and 20% minor components. The remaining 3% protein is made up of minor components and has an especially high S content.

C. A. 39, 5256 (1945).

(226) Iselin, E., "The Spoilage of Fats and Oils." Mitt. Lebensm. Hyg. 35 113-48 (1944). - A comprehensive review. On the basis of Kiermeier's (C. A. 36, 1201) results, a method and apparatus were devised for extraction of fat from tissues and for determining its peroxide value. Briefly, 10 g. of tissue is extracted twice with 50 cc. ether under a stream of CO_2 introduced into the reflux condenser, and 50 cc. of ether is used for washing. A 10-cc. aliquot of extract is evaporated in a special tube to which is attached a special adaptor and the peroxide value is determined on the residue. 101 references.

C. A. 39, 5513 (1945).

(227) Iwasa, Y., "Utilization of the By-Products in the Preparation of Soybean Oil by the Alcohol-Extraction Method. I. Sugars." J. Agr. Chem. Soc. Japan 13, 225-30 (1937). - The soybeans were extracted with alcohol for the preparation of the oil. A sirup was separated from the oil in the alcohol extraction. It consisted of H_2O 17.43, carbohydrates 70.09, protein 5.20, fat 2.28, and ash 5.00%. Glucose, fructose, galactose, rhamnose, arabinose, glucuronic acid, sucrose, and stachyose were found in the sirup. The ratio of sucrose to stachyose was 3.50:1.90.

C. A. 31, 5607 (1937).

(228) Iwasa, Y., "Utilization of the By-Products in the Preparation of Soybean Oil by the Alcohol-Extraction Method. II. Saponin." J. Agr. Chem. Soc. Japan 13, 231-32 (1937). - Saponin was precipitated by the addition of H_2SO_4 to the sirup above-mentioned. It was a crystal decomposing at 220-25°. It was hydrolyzed into rhamnose, arabinose, galactose, glucuronic acid, and sapogenin.

C. A. 31, 5607 (1937).

(229) Iwasa, Y., "Utilization of the By-Products in the Preparation of Soybean Oil by the Alcohol-Extraction Method. III. Fermentation of the Sirup." J. Agr. Chem. Soc. Japan 13, 233-35 (1937). - Various alcoholic fermentation micro-organisms were inoculated on the aqueous solution of the sirup freed from saponin. The alcoholic production by Saccharomyces ellipsoideus was most superior. In this case the addition of 0.1% of $CoCl_2$ as the activator was most favorable.

C. A. 31, 5607 (1937).

(230) Iwasa, Y., "By-Products in Soybean Oil Extraction. IV. The Preparation of Caramel from Stachyose of Soybeans." J. Agr. Chem. Soc. Japan 14, 1515-16 (1938). - Crude stachyose obtained from the by-products in the extraction of soybean oil by alcohol was hydrolyzed with dilute HCl, neutralized to pH 2-3, and then dehydrated by heating at 130° C. A superior quality of caramel was prepared. Commercial caramel could not be obtained by the direct heating of stachyose.

C. A. 33, 5220 (1939).

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(231) James, E. M., "The Continuous Centrifugal and Some of Its Applications." Chem. Met. Eng. 38, 325 (1931). - The problems of clarification, hydro-extraction, separation by the use of continuous centrifugal, separation of solids from liquids, centrifugal treatment of emulsions, special development of low-speed centrifugals, the underlying principles, and the economic applications of these machines are briefly described.

C. A. 25, 3742 (1931).

(232) Jamieson, G. S., Baughman, W. F., and Brauns, D. H., "Chemical Composition of Peanut Oil." J. Am. Chem. Soc. 43, 1372-81 (1921). - The 2 samples of oil used (from the white Spanish-type of peanuts grown in South Carolina and from the Virginia-type of peanuts grown in Virginia) had the following constants, respectively: d. 25/25 0.9148, 0.9136; I number (Hanus) 90.1, 94.8; saponification value 188.2, 187.8; unsaponifiable matter (%) 0.22, 0.27; acid value 0.12, 0.03; Ac value 8.7, 9.50; R.-M. number 0.27, 0.21; Polenske number 0.12, 02.9; saturated acids (%, corrected) 20.6, 16.4; unsaturated acids (%, corrected) 74.6, 78.7; I number of unsaturated acids 121.8, 118.2. They consisted of the glycerides of the following acids: oleic, 52.9, 60.6; linoleic, 24.7, 21.6; palmitic, 8.2, 6.3; stearic, 6.2, 4.9; arachidic, 4.0, 3.3; lignoceric, 3.1, 2.6%. Hypogaeic acid was carefully tested for but could not be detected.

C. A. 15, 3911 (1921).

(233) Johns, C. O. and Jones, D. B., "The Proteins of the Peanut, Arachis Hypogaea. I. The Globulins, Arachin and Conarachin." J. Biol. Chem. 28, 77-87 (1916). - Two globulins, arachin and conarachin, were isolated from the peanut. The former contains 0.4% S and 4.96% basic N; the latter, 1.09% S and 6.55% basic N. This is the highest value recorded for basic N in any seed protein. It is possible that peanut press-cake may, therefore, be highly effective in supplementing food products made from cereals and other seeds whose proteins are deficient in basic amino acids. 500 g. oil-free peanut meal were extracted with 2.5 l. of 10% NaCl solution, filter paper pulp was added to a thick pulp, and the mixture thoroughly pressed. The liquid obtained was filtered clear and the arachin precipitated by the addition of $(NH_4)_2SO_4$ to 0.2 saturation. After filtering out, it was dissolved in 10% NaCl and dialyzed. The precipitated globulin was filtered out, washed with EtOH and Et_2O, and dried in vacuo. The filtrate from the arachin was either completely saturated with $(NH_4)_2SO_4$ and the precipitate dialyzed or it was dialyzed directly. Either method yielded a small amount of conarachin. The NaCl extracts also contained a small amount of an albumin, coagulating at 65-70° C.

C. A. 11, 466 (1917).

(234) Johnson, H. F., Jr. and Bliss, H., "Liquid-Liquid Extraction in Spray Towers." Trans. Am. Inst. Chem. Engrs. 42, 331-58 (1946). - Experimental work on liquid-liquid extraction is presented, which work includes 109 extraction runs with 4-systems in a tower of 1.824-in. inside diameter. Major emphasis is placed on the extraction coefficient, K_a and distribution, but some attention is given to the flooding phenomenon. K_a increases with both dispersed and continuous phase flow rates, increases slightly with increases in entering solute concentration, and tends to decrease somewhat with increase in tower length. When extraction is from continuous to dis-

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persed phase, K_a is greater and drop coalescence is less than when extraction is in the other direction. Optimum distributor design is discussed. Correlation methods for roughly predicting over-all coefficients for 1 system in a specific spray tower from data taken with another system in the same apparatus are suggested. Comparisons are made among spray, packed, and perforated plate towers and conditions in which the spray tower may well be advantageous are deduced from these results.

C. A. 40, 4567 (1946).

(235) Johnson, P., "Proteins of the Groundnut (Arachis Hypogaea). I. The Isolation and Properties of the Proteins." Trans. Faraday Soc. 42, 28-36 (1946). - The proteins arachin and conarachin were examined chiefly by ultracentrifugal methods. These fractions were extracted from the groundnut by 10% NaCl solution and the proteins precipitated by either dilution and acidification or by the addition of $(NH_4)_2SO_4$. The 3 fractions obtained by dilution and acidification to pH 5 and by 40% saturation with $(NH_4)_2SO_4$, thought to be identical by previous workers, contain different sedimenting components, $\overset{o}{S}_{20}$ = 14.6, 9.5, and 14.6 (Svedberg units), respectively. At 65-85% saturation with $(NH_4)_2SO_4$ two further components ($\overset{o}{S}_{20}$ = 6.2, 4.8) were obtained. No trace of the $S^{9.5}$ component was observed in the fractional precipitation by $(NH_4)_2SO_4$. By use of the value $D^{o}_{20} = 3.2 \times 10^{-7}$ for the diffusion constant, the molecular weight for the $S^{14.6}$ component was calculated to be 396,000 and the fractional ratio 1.4. A 0.05 M phosphate buffer at pH 8 and 16 ± 2° was used as solvent for the protein fractions, which were examined at a concentration of 0.5-1.5 g./100 cc. at 20 ± 1° for stability and solubility. The electrophoretic analyses at 4° indicated two boundaries at higher protein concentration.

C. A. 40, 5075 (1946).

(236) Johnstone, H. F., Spoor, I. H., and Goss, W. H., "Properties of Soybean Oil-Solvent Mixtures." Ind. Eng. Chem. 32, 832 (1940). - The densities, viscosities, and n of mixtures of soybean oil and hexane, ethylene dichloride, and trichloroethylene are shown in tables and graphs for use in design calculations on pumps, piping, and heat-transfer equipment and for control analysis. The temperature effects on mixing the oil with these and a number of other solvents are also given. The normal effect of a solvent on the oil is to break up the association between molecules of the glycerides. This results in a rapid increase in the fluidity. In solvents which form H bonds, molecular complexes appear to exist with a constituent of the oil present in relatively small proportions. This is important in the choice of a selective solvent for separating the constituents of the oil.

C. A. 34, 4599 (1940).

(237) Jones, D. B. and Horn, M. J., "Properties of Arachin and Conarachin and the Proportionate Occurrence of these Proteins in the Peanut." J. Agr. Res. 40, 673-82 (1930). - Oil-free meal from ground, shelled groundnuts contained 7.36% N (= 40.48% of crude protein). The meal contained approximately 25% and 8% of arachin and conarachin, respectively. Arachin has $[\alpha]^{20}_{D}$ -39.5°, does not coagulate in boiling 10% sodium chloride solution, but is precipitated completely from 10% salt solution containing 40% of ammonium sulphate. Conarachin has $[\alpha]^{20}_{D}$ -42.7°, coagulates in 10% salt solution at 80°, and is precipitated at 85% concentration of ammonium sulphate. No appreciable quantities of albumin, prolamin, or glutelin were found.

Br. A. A, 826 (1930).

(238) Jones, D. B., "Symposium on Substitutes for Animal Protein in Nutrition. Nutritive Value of Soybean and Peanut Proteins." Federation Proc. 3, 116-20 (1944). - Discussion with bibliography.
C. A. 38, 4288 (1944).

(239) Jonnard, R., "Design of Large-Size Laboratory Extraction Glass Apparatus." Ind. Eng. Chem., Anal. Ed. 16, 61 (1944). - An extractor is described for operation at ordinary or reduced pressures which permits the collection of all pertinent data required for pilot work. Extraction of 5.5l per hr. at ordinary pressure is possible with 350 sq. cm. condensing surface. A stopcock permits controlled periodical or continuous circulation of the solvent.
C. A. 38, 897 (1944).

(240) Joyce, H., "Soybean-Oil Extraction as Developed at the Edison Institute of Technology." Oil & Soap 12, No. 4, 68-70 (1935). - A new extractor utilizes the gases from a 4-cylinder gasoline engine in place of steam, and the water circulates through the water jacket on the motor to supply heat for the evaporator. This extractor will handle 100 bushels of beans a day.
C. A. 29, 3541 (1935).

(241) Junker, M., "Soybean Extraction." Allgem. Oel- u. Fette-Ztg. 30, 492-95 (1933). - Mucilage (I) may be separated in the hydrated condition by treating the extracted oil with small amounts of H_2O; the oil is dried and centrifuged and I is worked up for recovery of oil, phosphatides, etc.
C. A. 28, 4258 (1934).

(242) Juschkevitsch, S. F., Brilling, S. A., and Antonemkov, F., "Extraction of Oil from Soybeans." Masloboino Zhir. Delo, No. 4-5, 52-3 (1932). - C_2HCl_3 and $C_2H_2Cl_2$ give good yields, but impart an objectionable odor and taste.
Br. A. B, 753 (1933).

(243) Juschkevitsch, S. F., Brilling, S. A., and Antonemkov, F. V., "Relations of Yield and Quality of Soybean Oil to the Kind of Solvent Under Various Conditions." Schr. Zentr. Biochem. Forschungsinst. Nahr. Genussm., Moscow 2, 380-99 (1933). - Choice of solvent has little effect on the physical and chemical constants of the oil, but has a great effect on yield and biochemical behavior. For technical grades C_2HCl_3 and $C_2H_4Cl_2$, whilst for edible grades C_6H_6, CCl_4, or gasoline, are recommended.
Br. A. B, 108 (1934).

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(244) Karsten, Alfred, "Continuous Oil-Extraction Plant, Simon Type." Chem. App. 15, 195-97 (1928). - Directions, with elevation and 2 cuts, for operating the apparatus.

C. A. 22, 4849 (1928).

(245) Karsten-Salmony, A., "Method of Oil Extraction." Chem. Obzor 3, 204-05 (1928). - Description of an automatic extraction apparatus (Simon system) of A. Borsig.

C. A. 22, 4848 (1928).

(246) Kaufmann, H. P. and Keller, M. C., "Oil Seed Analysis. II. The Moisture Determination." Fette u. Seifen 49, 93-102 (1942). - A review of methods is presented. For the oven method the effect of time and temperature on the results on rape seeds is tabulated. For the distillation procedure the solvents xylol, toluol, benzol, cyclohexane, benzine (b. 90-95° C.), and n-heptane (b. 98° C.) were compared. Results by the titrametric method on rape seed samples were also presented.

O. & S. 20, 47 (1943).

(247) Kausch, O., "Oil and Fat Extractors." Z. Deut. Oel-Fett-Ind. 42, 4-6, 23-4, 37-9, 100-01, 118-20 (1922). - Descriptions are given of 49 German patents for extracting fats and oils by means of solvents.

C. A. 16, 1513 (1922).

(248) Kerkhoven, C., "A New Method for Processing Olives for (Extraction of) Oil." Öle, Fette, Wachse, Kosmetik 1936, No. 9, 7-8. - If the olives were not dried before solvent extraction, a better grade of oil was obtainable; however, it was admitted that 2% of the oil remains in the residue. Details of the method are not presented.

O. & S. 14, 61 (1937).

(249) Kettering, James H., "Isopropyl Alcohol in Cotton Wax Determination." Ind. Eng. Chem., Anal. Ed. 18, 275 (1946). - Replacing ethyl alcohol with isopropyl alcohol, which is cheaper and more readily available, as extracting solvent in the Conrad method for the determination of wax in cotton fiber, does not alter the values obtained.

S. R. R. L. 1946.

(250) Kettering, J. H., Goldthwait, C. F., and Kraemer, R. M., "Solvent Extraction of Cotton Wax." Textile Research Journal 16, No. 12, 627-34 (1946). - Wax is extracted by use of solvents from cotton.

M. B.

(251) King, Charles O., Katz, Donald L., and Brier, John C., "The Solvent Extraction of Soybean Flakes." Trans. Am. Inst. Chem. Engrs. 40, 533-56 (1944). - Experimental data were obtained on the solvent extraction of soybean flakes of various screen sizes and average thickness of 0.0080, 0.0190, 0.0171, and 0.0207 in. in solvent mixtures containing approximately 0, 5,

10, and 15% raw soybean oil in trichloroethylene. Supplemental data were obtained for the extraction of oil-saturated porous clay plates with trichloroethylene and for the extraction of different soybean flakes with a CCl_4-ethylene dichloride mixture. The application of the theory of molecular diffusion to the extraction of the oil from a uniform porous inorganic solid was confirmed. The simple diffusion theory for uniform porous solids does not correlate the extraction data for the soybean flakes. The structure of the soybean flakes was considered to be the cause of the divergence from theory. General extraction rate curves and equilibrium data have been utilized for the prediction of extraction time under commercial conditions.
C. A. 39, 3 (1945).

(252) Kirschenbauer, H. G., Fats and Oils, an Outline of Their Chemistry and Technology. New York: Reinhold, 1944. 154 pages. - This little volume presents a brief, simple survey of the origin, methods of extraction, chemistry, and processing of fats and oils.
M. B.

(253) Klatt, T. J., Parker, E. D., Pomes, A. F., and Porges, N., "Food Yeast Growth on Peanut Protein Waste Liquors." Oil & Soap 22, 319-21 (1945). - Peanut protein waste liquor supplemented only with an ammonium salt was found to be an excellent medium for the propagation of the food yeast, Torulopsis utilis, in batch and continuous processes. When N was provided to give a C:N ratio of 8:1, 100 g. of sugar yielded 18 g. of a high-protein yeast that was comparable in food value and vitamin content to food yeasts from other sources. 13 references.
C. A. 40, 979 (1946).

(254) Knapp, O., "Concerning a Three Years' Extended Research with Summer Oil Grains." Fette u. Seifen (n.s.) 51, 165 (Apr., 1944). - Statistics of yield in seed, oil, and oilcake.

(255) Koch, Paul-August, "Synthetic Noncellulose Textiles and Their Properties, Synthetic Protein Fibers, Glass Threads and Fibers, and Completely Synthetic Fibers." Klepzig's Textil-Z. 43, 636-45, 958-67, 1025-28 (1940). - The following subjects are discussed in detail: classification of the synthetic textiles, basis of the manufacture of noncellulose fibers, chemical properties, chemical methods of identification, microscopy, and technologic properties. Tables give detailed information on the manufacture and chemical properties of these textiles, and amino acids present in wool, keratin, silk fibroin, casein, and fish protein, the composition of nylon and rayon, optical properties, sp. gr. of synthetic noncellulose textiles, technological data on single threads and fibers, and strength and tension data. Photomicrographs of these fabrics are shown. 80 references.
C. A. 35, 3447 (1941).

(256) Kodangekar, P. R., Mandlekar, M. R., and Mehta, T. N., "Utilization of Vegetable-Oil Cakes for the Production of Protein." Indian Chem. Soc. J., Indus. and News Ed. 9, No. 1-2, 34-44 (1946). - Various possibilities for utilizing vegetable-oil press or expeller cakes were investigated. Protein was extracted from peanut, gingilley, mowrah, linseed, and castor-bean cakes, after the oil had been extracted by a cold or hot expeller or hydraulic process. Since meals of low oil content give better proteins, the residual oil from the cakes was removed before the protein extraction, by

using an azeotropic mixture of benzene and MeOH. The oil-free meal was then treated with Na_2SO_3 or NaOH solutions of varying concentrations and the influence of solvent pH upon the protein peptization was studied. The maximum peptization of protein after 2 successive extractions with 0.3-0.4% Na_2SO_3 solutions was: peanuts 90.7% protein, pH 8.11; linseed 94.69% protein, pH 7.44; gingilley 48.83% protein, pH 8.22; castor 32.25% protein, pH 7.70; mowrah 21.5% protein, pH 5.70. When 0.3-0.5% NaOH solution was used as a solvent, the following figures were obtained: peanut 97.2% protein, pH 11.72; linseed 96.32% protein, pH 11.69; castor 89.6% protein, pH 11.73; gingilley 75.65% protein, pH 11.72; mowrah 70.9% protein, pH 11.68. The protein peptization was also influenced by the particle size. The yield of peptized protein increased rapidly as the particle size was reduced from 48 mesh down to 150 mesh; further reductions in particle size had no appreciable effect. Since the protein obtained from the oilcakes was to be used principally for plastic purposes, precautions were taken to produce a suitable, not denatured, product. The oil-free meal of peanuts was treated, in stainless steel or glass apparatus, with 0.3% Na_2SO_3 and mechanically stirred for one hour while a pH of 7.0 was maintained. After centrifuging in a Sharples supercentrifuge the aqueous suspension was precipitated with H_2SO_3 at 30° and a pH of 4.5. The precipitated protein was washed with alcohol and ether and dried in a vacuum oven at 120° C. The resulting protein was a white amorphous powder containing 88% N and 8% moisture. Peanut protein, which consists chiefly of glycine, is very sensitive to oxidation by air; in alkaline solution it readily becomes brownish and is gradually broken down into smaller aggregates.

C. A. 41, 4661 (1947).

(257) Kolfenbach, J. J., Kool, E. R., Fullmer, E. I., and Underkofler, L. A., "Laboratory Continuous Countercurrent Liquid-Liquid Extractor." Ind. Eng. Chem., Anal. Ed. 16, 473-4 (1944). - A liquid material such as fermentation mash is extracted with an immiscible solvent such as Et_2O by pumping the mash at the rate of 4.2 l. per hr. so that it falls as a spray through a column of Et_2O which is circulated by boiling and condensation at the rate of 2 l. per hr. Other sizes of apparatus can be used if the rates of circulation are varied accordingly. A modification can be made so that a heavy liquid can be used as the extracting medium. A complete diagram and description are given.

C. A. 38, 4837 (1944).

(258) Komuro, Tosimitu, "Properties of Soybean Protein Solutions." Kwagaku Kokyo Siryo (Mat. of Chem. Ind.) 13, 19-27 (1940). - Soybean protein was dissolved in NaOH of various concentrations (0.4-0.85%) (protein content 8-10%), and the viscosity, alkalinity, and the rate of protein reprecipitation were measured at 10° and 20° at 2-73 hrs. after preparation of the solution. The viscosity of the solution falls rapidly and then slowly. The greater the concentration of NaOH, the more the viscosity decreases. At higher temperature the viscosity change is greater. Decrease of alkalinity, lowering of the rate of protein reprecipitation, and increase of formol-titratable N are parallel to the lowering of the viscosity of the solution. The reaction for NH_3 by Nessler's reagent becomes positive more rapidly in the case of greater concentration of NaOH and at higher temperature. These changes are caused by the decomposition and dispersion of the proteins. Soybean protein dissolved in 49.5% urea solution was more stable than that in NaOH, and this deserves consideration for manufacturing artificial fiber from soybean protein. The viscosity changes were also compared in dilute solutions of various pH values (7-13) of glycinin extracted with

aqueous NaCl, alkali-extracted soybean proteins, and acid-extracted proteins.

C. A. 35, 4122 (1941).

(259) Kondo, Kinsuke, Hayasi, Seiiti, and Morisige, Siniti, "Fractionation of Soybean Protein." J. Agr. Chem. Soc. Japan, 15727-36 (1939). - The protein prepared by extracting the soybean cake with dilute alkali was dissolved in 40% urea and precipitated by the addition of alcohol. The precipitate was separated into 3 fractions. The precipitate by dilute alcohol and the precipitate by concentrated alcohol at a definite pH were proved to be single proteins. The absorption spectrum of protein solution seemed to have some relation to the contents of cyclic amino acids such as tyrosine and tryptophan.

C. A. 34, 137 (1940).

(260) Koo, E. C. and Cheng, S.-M., "Extraction of Cottonseed Oil." Ind. Research, China 5, 71-5, 137-41, 338-43 (1936). - Experiments on the choice of solvents for extraction of cottonseed oil were reported. Benzine and benzene were found suitable. Acetone and carbon tetrachloride were less desirable. The best grade of oil was obtained by treating the seeds with alcohol, distilling off the alcohol, adding water, and finally extracting with benzene. Extraction of cottonseed oil on a large scale yielded 92% of the available oil.

O. & S. 14, 61 (1937).

(261) Koperina, A. J., "Extraction Apparatus for Solids and Liquids." Tabachnaya Prem. 3, 16-17 (1934). - Construction details are given of a laboratory extraction apparatus (glass) equipped with a reflux condenser and operated without a thimble.

C. A. 29, 2785 (1935).

(262) Kotasthane, W. V. and Narayana, N., "The Proteins of Groundnut (Peanut) Arachis Hypogaea, Linn." Proc. Indian Acad. Sci., Sec. B, 376-86 (1937). - Analyses were made of the proteins in the local (India) and Spanish peanuts. On the whole, the data show no appreciable difference in their composition, including a comparison with the Virginia, grown in America. Determinations were made of arginine, histidine, lysine, cystine, tyrosine and tryptophan.

C. A. 32, 3042 (1938).

(263) Kraemer, E. A. and Bailey, A. E., "Modification of Vegetable Oils. II. A Cocoa Butter Substitute from Cotton Seed Oil." Oil & Soap 20, 235-40 (1943). - Selective hydrogenation, followed by fractional crystallization from a solvent, has been used to prepare from cottonseed oil a hard butter, very similar to cocoa butter.

Author's Summary.

(264) Kummerow, F. A., "The Composition of the Oil Extracted from 14 Different Varieties of Andropogon Sorghum var. vulgaris." Oil and Soap 23, 273-75 (1946). - Fourteen varieties of grain sorghum were subjected to fractional solvent extraction. An average yield of 0.32% wax and 2.76% of oil was obtained. The fourteen grain oils are discussed.

Author's Summary.

(265) Kyame, L. and Altschul, A. M., "Comparison of Respiration, Free Fatty Acid Formation, and Changes in the Spectrum of the Seed Oil during the Storage of Cottonseed." Plant Physiol. 21, 550-61 (1946). - Samples of cottonseed were analyzed for free fatty acid content, and the lipolysis rate constant was determined for each sample. The lipolysis constants were plotted as a function of moisture content. Those for the "Delfos" seed fell on a smooth curve and those for the "Coker's" and "Oklahoma Triumph" varieties fell on a second smooth curve which was lower than the "Delfos" curve. It was found that the lipolysis constant can be converted into a linear function of the moisture content of the seed. A variation of the spectrum of solvent-extracted cottonseed oils during storage was found to exist. The highest moisture samples of the "Coker's" and "Oklahoma Triumph" varieties showed a common pattern which was in turn different from that exhibited by "Delfos" variety. The pattern of lipolysis for immature seeds differed from the pattern for normal cottonseed in that the rate of formation of free fatty acids decreased with length of storage. The "Delfos" seeds exhibited more vigor both with respect to lipolysis and respiration than did the seeds in the "Coker's" and "Oklahoma Triumph" varieties.

S. R. R. L. 1946.

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(266) Leahy, John F., "Processing Oil Seeds and Nuts. I. Economics and Statistics." Southern Power and Ind. 59, No. 1, 44 (1941). - At present the cottonseed industry suffers from decreased production of lint cotton and competition of soybean. The industry should modernize plants as regards power and install expellers, etc., in place of hydraulic presses. Provision should be made for handling other seeds or nuts. Cottonseed meal is competitive with soybean meal for many purposes. Satisfactory plastics have been made experimentally from cottonseed linters and hulls as fiber material and the protein together with a synthetic resin as the binding agent. The hulls also may be processed to hull fiber and hull bran, the latter serving as an excellent source of furfural, lignin, and activated carbon.
C. A. 35, 2021 (1941).

(267) Leahy, John F., "Processing Oil Seeds and Nuts. II. New Methods and Equipment." Southern Power and Industry 59, No. 3, 63-69 (1941). - The solvent extraction process employs fewer operators and is more economical in electrical horsepower requirements than is the case with expellers, but the investment cost for equipment is substantially greater than comparable cost for the mechanical processes. However, this solvent method makes available the oil-seed protein in a form suitable for industrial use. Equipment and processes used in the cottonseed oil expeller plant in Marks, Mississippi are described. M. B.

(268) Leahy, John F., "Processing Oil Seeds and Nuts. III. Oil Extraction by Solvent Extraction Process." Southern Power & Ind. 59, No. 8, 62-7 (1941). - Solvent extraction is not directly applicable to materials of high oil content or to oils not readily soluble in usual solvents, such as castor oil, but may be used to extract residual oil. Soybeans have favorable characteristics for solvent extraction, with a recovery of 366 lb. oil out of the 380 lb. present per ton as compared with only 305 lb. for mechanical recovery. Solvent loss is about 3 gallons per ton of beans processed. Less favorable results are secured with cottonseed, which should be cooked before extraction. Materials other than oil are extracted, making refining of oil necessary, and the value of the residue is also less than with mechanical recovery. Linseed processing appears to be more inviting.
C. A. 35, 6821 (1941).

(269) Lege, Edouard, "The Transformation of Oleaginous Matter into Mixtures of Hydrocarbons." Compt. Rend. 206 1264-66 (1938). - Seeds are first heated at about 600° so that a pure coke remains and the volatile matter is condensed. When the latter is again subjected to heating, 75% is converted into hydrocarbons. Data are given of the chemical and elementary analyses of peanut oil and of the primary distillation products.
C. A. 32, 5649 (1938).

(270) Leont'evskii, K. and Gil'tan, D., "Technological Equipment in the Oil-Extraction Industries." Pishchevaya Prom. 1, No. 2, 15-7 (1941). - Various types of equipment used in the expressing of fat and oil from seeds are described. It was recommended that material of high oil content should be prepressed to less than 30% oil and then solvent-extracted.
O. & S. 23, 115 (1946).

(271) Leont'evskii, K. and Gil'tan, D., "Extraction of Oil-Bearing Seeds with Dichloroethylene." *Pishchevaya Prom. 1*, No. 2, 25-6 (1941). - Data are presented to show the potentialities of dichloroethylene as an extractant for oil-bearing seeds. Apparatus for extraction and recovery of solvent is discussed.

C. A. 39, 5515 (1945).

(272) Lewis, W. K., "The Principles of Countercurrent Extraction." *J. Ind. Eng. Chem. 8*, 825-33 (1916). - Formulas are developed showing the influence of the size of any extraction system, the amount of extractor employed per unit amount of carrier heated, and the velocity of flow of carrier past extractor in any countercurrent system for the extraction of solids by liquids or of liquids by gases, or *vice versa*. Experimental evidence is presented which demonstrates the applicability of these formulas and justifies the recommendation of their use in the interpretation of data collected in the study of any extraction system, and in the design of new systems which it is desired to construct.

C. A. 10, 2785 (1916).

(273) Li, Er-Kang, King, Pei-Sung, and Lin, Shih-Shun, "Solvent Extraction of Soybean Oil." *Chinese Industry 1*, No. 1, 115-28 (1935). - Oil and fat in the soybean can be extracted by chloroform, ether, CS_2, CCl_4, benzene, benzine, or benzine and alcohol, the last mentioned being the best. Beans (150 g.) extracted with 200 cc. benzine plus 100 cc. alcohol yield 24.7 g. oil (91% of total oil content), but the oil obtained must be refined by physical or chemical methods.

C. A. 29, 2767 (1935).

(274) Lindenberg, A. and Winternitz, F., "Partition Coefficient of Isopropanol Between Olive Oil and Water. Influence of Concentration of Solutes in the Aqueous Phase." *Compt. Rend., Soc. Biol. 131*, 1085-87 (1939). - For isopropanol concentrations of about 0.5% the partition coefficient for the oil phase was 0.07 with distilled water, 0.09 with 0.5 *N* NaCl, 0.15 with 2 *N* NaCl, 0.09 with *N* urea solution, 0.105 with *N* glucose, and 0.1 with artificial sea water.

C. A. 33, 9092 (1939).

(275) Lindenberg, Alexandre, "The Comparative Effect of Crystalloids, *in Vitro* and *in Vivo*, on the Solubility of Volatile Organic Liquids in Water." *Compt. Rend. 222*, 515-17 (1946). - The presence of a nonvolatile polar substance in the aqueous phase increases the tendency of dissolved iso-PrOH to pass into an oil layer in contact with the solution. The distribution coefficients for oil-water solutions containing NaCl (0, 0.5, 1.0, 2.0 M), glucose (1.0 M), and urea (1.0 M) are, respectively, 0.07, 0.09, 0.11, 0.15, 0.105, and 0.09. The ratio (number of hydrophilic groups)/(molecular weight) is approximately constant for NaCl and glucose; if this is generally true, only the CO group of urea is active. The increase in the fugacity of the alcohol in the aqueous solution over that in pure water is proportional to the molecular concentration of the solute. Some applications to the water balance of organisms are pointed out.

C. A. 40, 4585 (1946).

(276) Lloyde, D. Jordan, "The Molecular Structure of Protein Fibers." *J. Soc. Dyers, Colourists 57*, 281-7 (1941). - A review of the composition and

molecular size and shape of protein fibers, with a discussion of the biological significance and some applications of the findings to leather manufacture.

C. A. 35, 7984 (1941).

(277) Low, A. M., "Textiles from the Test Tube Research on Synthetic Fibers." Indian Textile J. 56, 63-4 (1945). - A brief review. By mixing wool with new synthetic fibers, a textile is produced with the appearance and warmth of wool but costing much less. Small amounts of SiO_2 in thread woven or knitted into stockings make fabrics "nonslip". A fiber from peanuts and used in combination with wool and cotton makes warm, cheap garments. A new plastic in combination with cotton gives a solid material that can be worked like steel but is "soundless".

C. A. 40, 1319 (1946).

(278) Lundgren, Harold P., "Formation of Fibers from Nonfibrous Native Proteins." J. Am. Chem. Soc. 63, 2854-55 (1941). - In several widely different native, nonfibrous proteins dissociation and denaturation follow a preliminary unfolding of the molecule characterized by a single, sharp, slower sedimenting boundary in the ultracentrifuge. This unfolded or so-called α-form is labile and is not present long enough to be detected under usual conditions. With the use of detergents it is possible to control the transformation of the native forms into the unfolded configuration of all the nonfibrous proteins so far tested; the change was followed by the ability to draw fibers from the precipitated protein and by the corresponding viscosity changes in the system protein-detergent. Elastic and highly double-refracting fibers were obtained from crystalline egg albumin, hog thyroglobulin, wheat glutenin, casein, and commercial preparations of zein and blood albumin. One technique used was the addition to 4 ml. of dialyzed egg albumin at 25° of 10 ml. of 5% salt-free Nacconol N.R.S.F. (a Na alkyl aryl sulfonate) at pH 7.5; after 0.5 minute 2 ml. of saturated $(NH_4)_2SO_4$ is added to precipitate the protein which could be drawn into long silky filaments; after 3 minutes the precipitate became tough and it was no longer possible to form fibers.

C. A. 36, 105 (1942).

(279) Lynch, D. F. J., "Cottonseed and the Southern Regional Research Laboratory." Oil and Soap 16, 194-97 (1939). - Since many cotton farmers have borrowed to the limit on the lint portion of their crop, the cash income from the cottonseed is frequently the only money handled. Of vital interest to the cotton farmer and oil miller are efforts to increase the oil content of cottonseed, improve methods of extracting the oil in order to increase yields, and other research designed to improve the products from and raise the value of cottonseed. The commodities selected for initial study in the Southern Regional Research Laboratory are cotton, peanuts, and sweet potatoes, and in addition to research on cottonseed, such as enumerated above, studies will be carried out on cotton cellulose, the whole cotton plant, peanut oil and protein, sweet potato starch, and other products and byproducts of the assigned commodities.

Author's Summary.

(280) Lynch, D. F. J., Research on New and Extended Uses for Cotton. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Southern Reg. Res. Lab. AIC-177, New Orleans, La., 1942. 8 pages.

(281) Lynch, D. F. J., Industrial Utilization of Southern Farm Crops. United States Department of Agriculture, Southern Regional Research Lab., AIC 55, 1944. 8 pages. - A review of the investigational work now in progress at the Southern Regional Research Laboratory on such southern agricultural commodities as cotton, sweet potatoes, and peanuts.

C. A. 38, 6031 (1944).

(282) Lysikov, M. G., "Production of Synthetic Wool from Plant Proteins." Tekn. Byull. GUIV, No. 1, 46-7 (1940); Khim. Referat. Zhur., No. 8, 125 (1940). - A discussion of the extraction of proteins from plant seeds, preparation of stable solutions, and conditions for spinning and tanning of the fiber.

C. A. 36, 7325 (1942).

(283) Lyutenberg, Kh. and Ivanov, S., "Thorn Apple Seed Oil." Allgem. Oel- u. Fette-Ztg. 32, 141-46 (1935). - Petroleum ether extracted 10.3% oil from unripe seeds, 28.7% from half-ripe, and 22.4% from ripe seeds. Constants were determined for each type of seed. The oil is a good raw material for the soap and varnish industries. The seeds after the oil has been extracted can be used as a raw material for the extraction of the alkaloids atropine and hyoscyamine.

O. & S. 12, 217 (1935).

(284) Lyutenberg, Kh. and Ivanov, S., "Hyoscyamus Niger-Seed Oil." Allgem. Oel- u. Fette-Ztg. 32, 189-94 (1935). - Petroleum ether extracted 28.9% oil from ripe seeds. After heating 25 minutes at 280° the oil dried in 3 days. Some evidence is presented which shows that a solid, unsaturated acid may be present. The oil-free seed residue is a source of the alkaloids atropine and hyoscyamine.

O. & S. 12, 245 (1935).

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(285) McBride, G. W., "Chemical Engineering Advances in Soybean Processing." Chem. & Met. Eng. 47, 614-18 (1940). - The solvent extraction method was responsible for one-fifth of the total 1939 soybean oil production and is becoming increasingly popular. This article describes the extraction equipment and methods used, and systems for deodorizing the oils and fractionating them by liquid-liquid extraction. Uses of the soybean meal and protein are discussed.

M. B.

(286) McCay, C. M., "A Continuous Extractor of Large Capacity." Ind. Eng. Chem., Anal. Ed. 5, 213 (1933). - Apparatus is described for a continuous extractor which is used in biochemical and nutrition laboratories.

M. B.

(287) McCormack, R. H., "The Solvent Extraction of Oil From Acorns." J. of Am. Oil Chem. Soc. 24, No. 9, 299-303 (1947). - Acorns, collected in South Carolina and Florida, were shelled and processed in two types of extractors, the centrifuge and the continuous systems. Application of the solvent extraction theory to the experimental extraction of acorn oil is discussed.

M. B.

(288) McCracken, W. L., "Operating Conditions for Optimum Behavior of a Continuous Countercurrent Countergravity Extraction Plant." Iowa State Coll. J. Sci. 19, 47-49 (1944). - The particular problem was the extraction of oil from flaked soybeans with trichloroethylene. The vapors are non-explosive but perhaps toxic. The extractor consists of two lengths of steel pipe joined at an angle of 60°. The longer pipe is inclined at an angle of 15° to the horizontal. The flakes pass down the longer pipe countercurrent to the solvent which enters part way up the shorter pipe. Screw conveyors propel the flakes. Difficulties are due to clogging by filters used and cleaned alternately.

C. A. 39, 445 (1945).

(289) MacGee, H. E., "Extraction Naphthas: A Historical Outline." Oil and Soap 14, 322-4 (1937). - The development of extraction naphthas in the United States is given, showing types of solvents now used and their advantages. Three new solvents are available: hexane type, 146-158°C. boiling range, heptane type, 190-208°C. boiling range, and pentane type 96°C. to 138°C. boiling range.

C. A. 32, 1007 (1938).

(290) McGovern, E. W., "Chlorohydrocarbon Solvents." Ind. Eng. Chem. 35, 1230-39 (1943). - Important properties affecting commercial applications of the most commonly used chlorinated aliphatic hydrocarbon solvents are discussed. These properties include flammability, stability, effect on common engineering materials, toxicity, and selective solvent action. A table and charts summarizing physical data are presented. Important fields of application and factors leading to the selection of a solvent are discussed.

C. A. 38, 594 (1944).

(291) MacGregor, J., "Design and Operation of Solvent Extraction Plants." Chem. Age (London) 22, 598-600 (1930). - Chemical engineering problems en-

countered in the operation of a solvent extraction plant are discussed, including preparation and conditioning of the material to be extracted, methods of extraction, solvents and solvent recovery, and plant design.

M. B.

(292) Macheboeuf, M. A., Tayeau, F., and Bouville, J., "Influence of pH and Electrolytes on the Solubility of Peanut Proteins." Compt. Rend. Soc. Biol. 136, 557-59 (1942). - The maximum extraction of protein from peanut presscake was obtained with six volumes of 6% NaCl solution at pH 7.5 and 20°C. The yield was over 90% of the total protein present. Excellent yields were also obtained by extraction with 0.8% Na_2CO_3 solution.

C. A. 37, 4150 (1943).

(293) Macheboeuf, M. A. and Tayeau, F., "Proteins of the Peanut, Arachis Hypogaea. I. Extraction of Total Proteins from Defatted Peanut Meal. II. Purification of the Proteins." Bull. Soc. Chim. Biol. 24, 260-72 (1942). - I. Methods of extraction with dilute solutions of NaCl acids and alkalies are discussed. Best extractions are obtained with 0.8% Na_2CO_3 or 6% NaCl at 18-25°. II. Some unsatisfactory attempts to purify the proteins by precipitation from the NaCl solution by addition of acid or alkali are described.

C. A. 40, 1184 (1946).

(294) Macheboeuf, M. A. and Tayeau, F., "Proteins of the Peanut, Arachis Hypogaea. V. Chemical Composition and Nutritional Value." Bull. Soc. Chim. Biol. 24, 281-86 (1942). - The amino acid makeup of arachin and conarachin is discussed.

C. A. 40, 1184 (1946).

(295) Macheboeuf, M. A. and Tayeau, F., "Biochemical Studies on Peanut Protein Fractions." Corps Gras, Savons 2, 8-12 (1944). - Macheboeuf and Tayeau object to the technique of Johns and Jones where $(NH_4)_2SO_4$ (I) is used to salt out the two fractions arachin (II) and conarachin (III) in peanut protein. Only after removal of I by dialysis can homogeneous fractions be obtained. II is then insoluble in water, and III is soluble in water. The isoelectric pH of II is 5.2, that of III is 3.9. Various fractions of III, obtained by salting out with I, possessed the same isoelectric pH, 3.9. The third nutritional deficiency of II for the growth of the rat (cf. Baernstein) is postulated to be isoleucine.

C. A. 40, 5462 (1946).

(296) Macheboeuf, M. A. and Tayeau, F., "Biochemical Studies on Peanut Oil Cake." Corps Gras, Savons 4, 132-36 (1946). - Approximately 90% of the proteins in peanut oil cake can be dissolved by maceration with 6% NaCl solution at pH 7.5 for not more than 8 hours at 18-25°C. Longer maceration causes some denaturation to take place. Na_2CO_3 (optimum concentration 0.8%) is less suitable than NaCl as an electrolyte. Acid conditions are less favorable than alkaline (pH 7.5). Very little of the meal protein is soluble in distilled H_2O. Regardless of the electrolyte used, some nonprotein materials (glucosides, lipides, etc.) are also dissolved, and further treatment is necessary for their removal. If the dissolved proteins are precipitated by slight acidification (pH 4.4), most of the impurities remain in the mother liquor. Remaining impurities are largely removed by washing the precipitate exhaustively with hot alcohol, then with Et_2O. The

coagulum is still rich in P. The flavor of peanut meal obtained by solvent extraction of the oil is superior to that obtained from expeller cake. Oil left in the expeller cake finally becomes rancid and imparts a disagreeable flavor. C. A. 40, 5459 (1946).

(297) McKinney, R. S. and Freeman, A. F., "The Analysis of Tung Fruit." Oil and Soap 16, 151-52 (1939). - Methods applicable to the routine analysis of tung fruits were developed by taking into account such factors as variation in moisture content of individual fruit, high oil content of the tung kernels, and the high reactivity of the extracted oil. It was found that in a closed container the moisture distributes itself evenly between individual fruits, that the oil can be extracted completely from tung kernels if they are reground with sand, and that the moisture can be removed from ground tung kernels and the solvent completely removed from the extracted tung oil without deterioration in a vacuum oven at 100°C. with 28-29 inches vacuum.

Author's Summary.

(298) McKinney, R. S. Problems In Field of Tung Oil Extraction. Am. Soc. Mech. Engrs., Adv. Paper No. 201, Mtg. Mar. 31, 1941. 7 pages. - Hulling of tung fruit on farm, inexpensive dehydration of tung fruit without injury to or loss of oil, yields, solvent extraction of tung oil, and more profitable uses of tung oil by-products constitute major problems in field of tung oil extraction; notes on efforts of Tung Oil Laboratories to assist in solution.

E. I. 1941, 1259.

(299) McKinney, R. S., Rose, W. G., and Kennedy, A. B., "Some Problems of Interest to Tung Producers." Proc. Am. Tung Oil Assoc. 9, 62-77 (1943). - The regression coefficient to determine the relationship between kernel content and oil content of tung fruit was estimated. Studies were reported on the use of a modified portable English walnut huller for hulling tung fruit. Experiments are described on the recovery of oil from tung press-cake and tung fruit by means of solvent. The dehulled tung fruit was ground preparatory to extraction with a heavy-duty attrition mill. A Kennedy continuous countercurrent extractor was used for the tests with a normal hexane petroleum fraction as the extracting solvent. Varnish made from the solvent-extracted oil appeared to be as durable as a standard spar varnish. O. & S. 22, 242 (1945).

(300) McKinney, R. S., Rose, W. G., and Kennedy, A. B., "Continuous Process for Solvent Extraction of Tung Oil." Ind. Eng. Chem. 36, 138-44 (1944). - The Kennedy continuous extractor employed consists of a series of semi-circular sections fitted with perforated paddles to transfer the tung meal being extracted from one section to the next in a direction opposite to the gravity flow of the "miscella". Small pilot plant studies gave extraction efficiencies of 99% or better from tung press-cake or from tung kernels or seeds prepared for extraction by attrition grinding, or preferably by the formation of minute flakes in a roller mill. If proper precautions were taken to prevent free fat acid formation, the oil extracted from tung seeds or kernels was of high quality, judged by its characteristics and by exposure tests made on varnishes prepared from it with phenolic resins. Oil extracted from tung press-cake is of poorer quality but is regarded as acceptable to the paint and varnish industry.

C. A. 38, 1652 (1944).

(301) McKinney, R. S. and Oglesbee, R. E., "Some Variations in Solvent-Extracted Tung Oils Resulting from the Solvents Employed." Amer. Tung Oil Assoc. Proc., 43-47 (1945). - Extraction of tung oil with petroleum naphthas on laboratory and continuous pilot-plant scales indicates that the source and type of naphtha fraction used may affect the quality of oil recovered. One heptane fraction yielded oil which was solid at room temperature, while heptane from another source yielded oil that was almost entirely liquid at ice-box temperature. Hexane fractions yield oils liquid at room temperature and solid in the cold. Petroleum-naphtha-extracted tung oils make spar varnishes only slightly inferior to those prepared from expressed American tung oil. Trichlorethylene as an extractant yields oil of excellent quality.

C. A. 39, 4498 (1945).

(302) Magne, F. C. and Skau, E. L., "Viscosities and Densities of Solvent-Vegetable Oil Mixtures." Ind. Eng. Chem. 37, 1097-1101 (1945). - Because of the increased use of solvent extraction and low-temperature solvent crystallization in the processing of vegetable oils this investigation was undertaken to study the variations of d. and N as a function of oil concentration and temperature for various solvent-vegetable oil mixtures. The d. and N measurements were made from incipient crystallization to a temperature near the boiling point of the solvent for the complete binary systems, cottonseed oil-Skellysolve B (commercial hexane), cottonseed oil-acetone, cottonseed oil-2-butanone, peanut oil-Skellysolve B, and soybean oil-Skellysolve B. From the data obtained it is possible to construct for any of these systems the d. composition and N-composition curves for any composition. The d.-composition isotherms are not quite straight lines. An empirical equation was fitted to each of the isotherms of the form $D = a + bP^2 + cP^2 + dP^3$, where D = d. at composition P and a, b, c, and d are arbitrary constants, a, b, c, and d are determined and tabulated for the various systems. Variations in the behavior of the systems from that of ideal solutions are discussed. N-composition isotherms show that N of the oils is greatly reduced by adding about 10% solvent, but N of the solvent is not greatly increased by adding the same percentage of oil. Applications of the data obtained are discussed. I value has considerable effect on N of oils and their solutions. A pycnometer for determining ds. at low temperatures and a modified Ostwald viscometer are described.

C. A. 40, 226 (1946).

(303) Malone, T. J., "Solvent and the Soybean Flake." Amer. Miller and Processor 74, No. 8, 48-52 (1946).

(304) Maloney, J. O. and Schubert, A. E., "The Application of Rectangular Coordinate Methods to Solvent Extraction Design." Trans. Am. Inst. Chem. Engrs. 36, 741-57 (1940). - A graphical method for the design of equipment for solvent extraction operations is presented which is similar to the Ponchon and Savarit method for rectification. This method is based upon the expression of the equilibrium and solubility data of the system under consideration on a diagram using rectangular coordinates. The method is illustrated by applying it to a problem previously worked out by Varteressian and Fenske (Cf. C. A. 30, 7914) and the results of the 2 different solutions are compared.

C. A. 35, 3 (1941).

(305) Manse, P., "The Oil Industry. I." Monit. de l'Aliment 39, No. 371, 5-6 (1945). - Pressing and extraction from oilseeds.

(306) Manse, P., "The Oil Industry. II." Monit. de l'Aliment 39, No. 372, 8 (1945). - History of extraction of vegetable oils.

(307) Markley, K. S., "Composition of Cottonseed Hull Bran." J. Am. Soc. Agron. 20, 1102-07 (1928); Expt. Sta. Record 60, 358 (1928). - From analyses of cottonseed hull bran, in which were determined moisture, ash, crude fat, crude protein, crude fiber, N-free extract, furfural yield, pentose and pentosan calculated from the furfural, dextrose, sucrose, galactose, reducing sugar after hydrolysis calculated as dextrose, and the same calculated as xylose, crude cellulose, and lignin, together with an analysis of the crude cellulose for ash, pentosan, α-cellulose, and β-cellulose, it is concluded "that cottonseed hull bran is a more valuable product than was heretofore thought to be the case." Furfural amounting to 22.28% on the air-dry or 25.39% on the oven-dry basis, xylose with other pentoses amounting to about 40%; and crude cellulose amounting to 51% were among the products obtained.

C. A. 24, 3124 (1930).

(308) Markley, K. S. and Lynch, D. F. J., "The Technology of the Cottonseed-Crushing Industry." Cotton Research Congr., Proc. 1, 211-24 (1940). - A review and discussion of progress in the extraction, refining, bleaching, winterization, deodorization, and hydrogenation of cotton-seed oil.

C. A. 36, 5040 (1942).

(309) Markley, K. S., "Research on Peanuts and Peanut Products at the Southern Regional Research Laboratory." Ann. Report Natl. Peanut Council, Inc., 51-61 (1943-1944); Peanut Journal and Nut World 14, No. 1, 57, 55 (1944); reprinted without bibliography in Oil Mill Gazetteer 50, No. 7, 10-11, 13, 19-21, 23 (1946); U. S. D. A., Bur. of Agr. and Ind. Chem., AIC-109, 1944. 17 pages.

(310) Markley, K. S., Union Margariniere Belge, S. A., Baasrode, Belgium. United States Dept. of Com., Off. Pub. Bd., Rpt., PB 1263, Washington, 1945. 7 pages. - Description of facilities and methods at plant processing peanuts, palm kernels, sheanuts, and copra for oil. During the war no sesame or copra were processed. The plant also refines palm oil, palm kernel oil from the Belgian Congo, soybean oil (previously from Manchuria), whale oil, and seal oil. The crude oilmill consists of one 125-ton standard Hansa-Muhle extraction plant and three combination expeller-hydraulic mills. Crude oil is shipped to soap works at various places, or hydrogenated and shipped to margarine manufacturers. No difficulty was experienced with reversion in margarine containing soybean oil, but it is used to the extent of only 5% and unhydrogenated. Most difficulty occurs with palm oil.

B. S. I. R. 1, 125 (1946).

(311) Markley, K. S. and Goss, W. H., German Fats, Oils, and Oilseed Processing Plants. United States Dept. of Com., Off. Pub. Bd., Rpt., PB 1316, Washington, 1945. 20 pages. - Oil processing and margarine production at the following four plants are described and discussed: 1. Estöl A.-G., Mannheim Industriehafen; 2. Hamburger Margarine Werke von Heinrich Voss,

Hamburg; 3. Verein Deutscher Oelfabriken A.-G., Mannheim; and 4. J. H. Mohr and Co., Hamburg/Altona. Use of synthetic fatty acids in margarine is discussed. B. S. I. R. 1, 83 (1946).

(312) Markley, K. S., Richard Graebener Food Plant, Hamburg. Off. Pub. Bd., Rpt., PB 3452, 1945. 6 pages. - This plant is located in Karlsruhe, with a branch in Hamburg, and markets a soy sauce, soup stock, a bouillon cube, and other products under the trade mark "EtO". These products are basically amino acid preparations made by the acid hydrolysis of a variety of proteins, including the oilseed meals, bones, horns, dehydrated blood, etc. The production of these products from castor pomace and other compounds is related in detail. The detoxification of castor pomace is discussed, involving treatment by wet or dry heat at 100°C. or extraction with benzol, chloroform, and other organic solvents; the patents for the process are given. Such process is not used in preparation of the EtO products. B. S. I. R. 1, 267 (1946).

(313) Markley, K. S. and Goss, W. H., Fats, Oils, and Oilseeds. United States Dept. of Commerce, Off. Pub. Bd., Rpt., PB 7738, Washington, D. C., 1945. 44 pages. - Report on the subject industry as revealed through investigations of the following targets: (1) Delmenhorst Margarine Werke, Delmenhorst; (2) Henkel et Cie, G. m. b. H.; (3) Deutsche Fettsaure-Werke G. m. b. H. and the Markischen Seifen Industrie; (4) Oxo G. m. b. H.; (5) Fett-Raffinerie Zweigniederlassung der "Margarine Union" Vereinigte Oel- und Fett-Werke A.-G., Brake i. Oldenberg; (6) Reichstelle fur Fette und Eier Versuchsbetrieb Schleswig-Holstein, Elmshorn; and (7) Sunlicht Gesellschaft A.-G. B. S. I. R. 1, 492 (1946).

(314) Markley, K. S., Industry of Germany and the Occupied Countries. Fats, Oils, and Oilseeds. United States Dept. of Com., Off. Pub. Bd., Rpt., PB 7740, Washington, 1945. 19 pages. - This report summarizes the results of a survey of the fat and oil industry of Germany and the occupied countries of Belgium, The Netherlands, and Denmark which have in turn been reported in other reports. Plants investigated are listed in tabular form. Subjects include raw materials of the fat and oil industry of central and western Europe, economics, oilseed processing, refining and hydrogenation, margarine, reversion of soybean oil use of ethyl esters and other extenders in margarine, synthetic fatty acids and fats, industrial proteins, soaps and detergents, and research and control laboratories. B. S. I. R. 1, 492 (1946).

(315) Markley, K. S., Fats, Oils, Oilseeds and Related Industries of Germany and Northwest Europe. United States Dept. of Com., Off. Pub. Bd., Rpt., PB 18302, Washington, 1945. 348 pages. - Some of the sections are signed by W. H. Goss and others by K. S. Markley and W. H. Goss. Includes photostats of articles by F. Grandel and W. Picker. This volume brings under a single cover the results of a three months' investigation of the fats, oils, and oilseeds industry of Western Europe, including the American and British occupied zones of Germany and of Belgium, The Netherlands, and Denmark. Thirty-two plants in all were investigated and individual reports prepared on each. The present volume includes all of these in revised and enlarged form and they are preceded by a general summary to which is appended a list of the oil and oilseed processing plants of Germany and tabular data on supplies and disposition of fats in Greater Germany. B. S. I. R. 1, 851 (1946).

(316) Markley, K. S., *Report on Denmark--Fats, Oils, and Oilseeds--Dansk Sojakagefabrik Akts, Copenhagen, Denmark.* United States Dept. of Comm., Off. Pub. Bd., Rpt., PB 25671, 1945. 8 pages. - The Dansk Sojakagefabrik, oil mill is one of the largest in Denmark. The other large oil mill is owned by the Aarhus Oliefabrik Akts at Aarhus. There are three smaller oil mills, a Lever Bros. Soap Works, and several margarine plants. The oil mills have a capacity far in excess of the country's consuming power for fats, and hence Denmark exports both butter and vegetable fats and oils. Production and consumption figures of butter and margarine. The Danish Soyacake Factory, solvent extraction plants, refineries, and dock and storage facilities are described. Hydrogenation, hydrogen and chlorine production, and other processes are described. Prior to the war they processed soybeans, copra, peanuts, sesame, linseed, and cottonseed; and refined palm kernel oil and fish and whale oil. They produced protein cake, and meal; crude and refined oils corresponding to the above, hardened oils, lecithin, distilled fatty acids, glycerine, caustic soda, hydrogen, oxygen, soap, and margarine.
B. S. I. R. *2*, 262 (1946).

(317) Markley, K. S., *Report on The Netherlands--Fats, Oils, and Oilseeds--Vereenigde Oliefabriek, Zwijndreckt, The Netherlands.* United States Off. Pub. Bd., Rpt., PB 25672, 1945. 9 pages. - The mergers which led to the control of the margarine industry on the continent by Lever Brothers and Unilever Ltd., are discussed. The report is divided as follows: I. ownership of plant; II. processing capacity and raw materials handled; III. continuous solvent extraction plant; IV. batch extraction plant; V. press plant; VI. refining; VII. hydrogenation; and VIII. laboratory. Machinery and processing in each plant are described. Prior to the war this plant, like the one at Baasrode, handled a wide variety of oleaginous materials including copra, palm kernels, soybeans, sesame, peanuts, and during the war rapeseed. At the time of the investigation they had on hand 6,000 tons of soybeans from the United States and expected some palm kernels.
B. S. I. R. *2*, 263 (1946).

(318) Markley, K. S., *Report on The Netherlands--Fats, Oils, and Oilseeds; the University of Delft, Delft, Laboratory for Organic Chemistry of the Technical College.* United States Off. Pub. Bd., Rpt., PB 25673, Washington, 1945. 6 pages.

(319) Markley, K. S., and Goss, W. H., *Germany--Fats, Oils, and Oilseeds.* United States Off. Pub. Bd., Rpt., PB 25674, 1945. 5 pages. - Report on investigation for the Food and Agriculture TIIC Subcommittee, prepared by direction of Field Information Agency, Technical, (U. S.).

(320) Markley, K. S., "Solvent Extraction and the Cottonseed Industry." *Oil Mill Gaz.* *50*, No. 9, 16-21 (1946).

(321) Markley, K. S., "The Cottonseed Processing Industry." *The Cotton and Cotton Oil Press* *47*, No. 17, A3-A6 (1946).

(322) Markley, K. S., "Solvent-Extraction and the Cottonseed Industry." *Oil Mill Gaz.* *51*, No. 7, 27-31 (1947). - A historical review on oil milling with emphasis on application of solvent extraction to cottonseed. A new

solvent process developed to a prepilot plant stage at Markley's laboratory (cf. Boatner and Hall) is described. Twenty-seven references.
C. A. 41, 2917 (1947).

(323) Martin, J., "Method of Extracting Soybeans by Means of a Solvent." Mat. Grasses 13, 5879-80 (1921). - The successive steps are as follows: the beans are finely ground and extracted for 30 minutes with benzine partially saturated with oil from previous extractions. The solvent is then drawn off into a still and more yellow benzine added and allowed to extract for 40 minutes after which the solvent is drained off for 1 hour. Fresh benzine is next added and the residue washed with it for 10 minutes. This washing is followed by draining for 30 minutes when steam is admitted to remove the solvent retained by the cake. This takes about 40 minutes and the entire operation of handling one charge takes from 3 to 4 hours.
C. A. 15, 3563 (1921).

(324) Mashino, M., "Improvement of Soybean Oil Extraction." J. Soc. Chem. Ind., Japan (Suppl. Binding) 32, 256 (1929). - The residue after extracting the oil from soybean by the azeotropic mixture of hydrocarbons (gasoline, benzine, toluene) and lower alcohols (methanol, ethanol) when purified was suitable for raw materials of foodstuffs. The amount of crude soybean extracted by the azeotropic mixture of hydrocarbons and low alcohols was a maximum compared to other mixed proportions of these solvents. In the extraction by the mixture of gasoline and methanol, the mixed solvent was one layer at the extraction temperature 40-50° C., but after extraction the gasoline layer contained soybean oil and the methanol layer contained carbohydrates, phosphatide, coloring matter, and other impurities. Two layers separated at room temperature. On evaporating the solvent of the upper layer, purified soybean oil was obtained. From the lower layer carbohydrates and phosphatides were recovered. The influence of the separation temperature of two layers was investigated and it was found that the lower the temperature of separation the greater the amount of soybean oil in the upper gasoline layer. Ten to twelve per cent H_2O in the solvent was effective in removing the oil in the lower layer to the upper layer. By adding more H_2O to the solvent, the amount of oil extracted is decreased.
C. A. 24, 2319 (1930).

(325) Mashino, M. and Nishimura, S., "Improvement of Soybean Oil Extraction. II. Relation Between the Boiling Point of Gasoline and the Optimum Proportion of Gasoline and Methanol in the Mixture. III. Effect of the Boiling Point of Gasoline on the Extraction with Azeotropic Mixture of Gasoline and Methanol." J. Soc. Chem. Ind., Japan (Suppl. Binding) 34, 402-05 (1931). - Soybeans were extracted with mixtures of methanol and 60-70°, 70-80°, and 80-90° gasoline, respectively. The percentage by weight of gasoline in optimum proportion of two solvents decreases and that of methanol increases about 2% as the boiling point of gasoline rises about 10%. The solubility of gasoline in methanol decreases as the boiling point of gasoline rises. Azeotropic mixtures of gasoline having average boiling points of 69.6, 77.2, 86.8, 95, 102.9, and 112.9° C., respectively, and methanol were made and extractions carried out. If the boiling point of the gasoline in the azeotropic mixture is lower than 104° C., the solvent separates into two layers after extraction, but if the boiling point is higher than this, it does not separate. The percentage by weight of gasoline in the mixture at the transition point is 31%.
C. A. 26, 864 (1932).

(326) Mashino, M., "Improvement of Soybean Oil Extraction. IV. Extraction with Azeotropic Mixtures Adding Lower Alcohols before or after Extraction." J. Soc. Chem. Ind., Japan 36, 309-10B (1933). - Azeotropic mixtures of aliphatic or aromatic hydrocarbons with MeOH or EtOH can be used for the extraction of soybean oil, if lower alcohols are added to the azeotropic mixture before or after the extraction, and the azeotropic mixture is evaporated off from the miscella, which separates into two layers after cooling, so that oil and alcohols can be removed. The purest and palest oil is obtained by using MeOH in the mixtures.

Br. A. B, 753 (1933).

(327) Matagrin, A., "The Extraction of Vegetable Proteins." Assoc. des Chim. B. 59, 583-603 (1942). - A review on the extraction of vegetable proteins with H_2O, alcohol, alkalies, and salt solutions.

C. A. 40, 650 (1946).

(328) Matagrin, A., "The Protein of the Soybean for Technical Uses; Composition, Characteristic Properties, and Methods of Extraction." Rev. Internatl. du Soja 7, No. 35-36, 20-4 (1947).

(329) Matz, W., "Mass Transfer in Solvent Extraction of Binary Systems." Z. Ver. Deut. Ing., Verfahrenstech 84, No. 4, 118-23 (1940). - A theoretical discussion based on the work of Sherwood, Evans, and Longcor, (C. A. 33, 9050).

C. A. 35, 2396 (1941).

(330) Matz, W., "Exchange of Material in Manufacturing Processes." Z. Ver. Deut. Ing. Verfahrenstech 85, 517-22 (1941). - A general discussion is given on the conception of the exchange of substances between phases, viz. on the 2nd fundamental principle, and on the problems of the flow and boundary areas. The exchange of substances between a liquid and a gaseous phase, and between two gaseous phases by using Gibbs' law is discussed. The processes of evaporation of pure substances, of insoluble mixtures of two substances, rectification, gas absorption, and the exchange of substances in chemical reactions, as well as the exchange of substances between two liquid phases, are discussed.

C. A. 38, 2239 (1944).

(331) Mauersberger, H. R., "Progress in New Synthetic Textile Fibres." Silk Jour. and Rayon World 20, No. 235, 32-33, 30 (1943). - Extracts from an address which takes up thermoplastic resins, new elastic Vinyon "E", and casein, soybean, and peanut protein fibers.

(332) Maugi, L., "New Technique in Oil Extraction." Tech. Modern 20, 601-08 (1928). - A description of modern apparatus used in the extraction and treatment of vegetable oils.

C. A. 22, 4849 (1928).

(333) Measmer, S. G., "Extraction of Oil from Soybeans Using a Mixture of Trichloroethylene and Ethyl Alcohol as a Solvent." Iowa State Coll. J. Sci. 17, 100-02 (1942). - Alcohol is combustible and its vapors in air are explosive; it dissolves only 12% soybean oil at 60°. When 10% trichloro-

ethylene is added, the solvent is quite safe and is miscible with soybean oil in all proportions when hot. After cooling, an upper layer, nearly pure solvent, and a lower layer, 50% oil, form. Only the lower layer requires distribution. Moisture decreased the miscibility with oil but added trichloroethylene restores it. A small continuous extractor which leaves only 1% of the oil in the bean is described.

C. A. 37, 3288 (1943).

(334) Mellon, J. C., "Solvent Extraction Rendering." Meat 25, No. 5, Sect. 2, 178-80 (1946); Butchers' Advocate 120, No. 24, 14-6 (1946). - Extraction of grease and tallow from dry-rendered inedible animal by-products.

(335) Merrifield, A. L. and Pomes, A. F., "Fiber from Peanut Protein. I. The Production and Properties of Sarelon." Textile Research Journal 16, No. 8, 369-77 (1946). - Production and properties of Sarelon, fiber produced from peanut protein and developed at Southern Regional Research Laboratory; fiber is light cream-colored in natural state and possesses soft hand and warmth similar to that of wool; it possesses affinity for dyes normally used on protein fibers and may be dyed with vat and direct cotton dyes; its major weakness like that of all synthetic protein fibers, is its low strength. The rate of dye adsorption on Sarelon is greater than on wool. Solid shades can be obtained by dying wool and Sarelon unions with a level-dyeing from a boiling dye bath containing Glauber's salt and acid. The apparatus and general methods of manufacture and experimental data are described and tabulated. Bibliography.

E. I. 1946, 1139.
C. A. 40, 6262 (1946).

(336) Meyer, H., "Notes on Extraction Plants for Oil Seeds." Chem. App. 20, 94-95, 103-05 (1933). - The flow sheet and details of construction for extraction plants are discussed. Summarized data for properties of oils and suitable solvents are presented.

O. & S. 11, 36 (1934).

(337) Meyerweissflog, W. E., "Solvent Extraction of Soybeans." Oil and Soap 14, 10-14 (1937). - The advantages and disadvantages of the expression and extraction processes for soybeans are discussed; and the conclusion is reached that the extraction process offers the greater advantage owing to higher yield plus the value of the lecithin produced as well as lower costs.

C. A. 31, 1645 (1937).

(338) Monroe, L. A. and Binnington, D. S., "Extractor for the Preparation of Oat and Other Cereal Oils." J. Ind. Eng. Chem. 20, 425-27 (1928). - Oat oil has been prepared in relatively large quantity by means of an extractor which is described in detail. It can also be used for the distribution of 20 gallons of liquid at one charging. It can be used for steaming materials or for impregnating substances with any desired vapor. Last traces of solvent are removed by vacuum distribution.

C. A. 22, 1864 (1928).

(339) Moore, N. H., "Solvent Extraction of Cottonseed." Oil Mill Gazetteer, (December, 1945).

(340) Moore, N. H., "Solvent Extraction Process Applied to Cottonseed." Food Ind. 19, No. 4, 471-73 (1947). - Results of pilot plant operations at Delta Products Company, Wilson, Arkansas, indicate increased yield of cottonseed oil by solvent extraction as compared with hydraulic process. New plant starts soon with operating capacity of 200 tons daily.

J. A. O. C. S. 24, 219 (1947).

(341) Morozov, I., "Changes in the Yield and Quality of Cottonseed Oil Obtained by the Skipin Method." Masloboino Zhirovoe Delo 12, 433-35 (1936). - The yield of first-run oil decreases with the increasing defectiveness of seeds. The sedimentation, coloring, and acidity of oil decrease with the progress of extraction.

C. A. 31, 1645 (1937).

(342) Moss, W. W., Jr., "Mechanical Processing of Vegetable Oils." Am. Soc. Mech. Engrs.--Trans. 59, No. 8, 715-19 (1937). - Function of unit operation engineering as applied to processing of oil; importance of basic factors required for efficient refining of edible oils; different means of processing oils by hydraulic expeller expression and extraction by solvent methods; hydraulic press of newer pot type described; advantages and disadvantages of impeller and piston type vacuum pumps, and thermocompressors.

E. I. 1937, 1218.

(343) Murlin, J. R., Edwards, L. E., and Hawley, E. E., "Biological Values and True Disgestibilities of Some Food Proteins Determined on Human Subjects." J. Biol. Chem. 156, 785-86 (1944). - The biological values of several proteins were determined on two groups of five and eleven human subjects who consumed for three days prior to the protein test period a protein-free diet which contained from 0.22 to 0.35 g. N per day. The biological value and true digestibility (comparing the fecal excretion on the protein diet with the fecal excretion on the nonprotein diet) are, respectively: whole egg protein 97 (range 92-100), 96; soybean protein (not stated whether raw or heated) 81 (72-92), 89; beefsteak protein 84 (72-93), 97; peanut protein 83 (67-95), 93; "kitchen food" yeast protein 87 (76-96), 87; and cottonseed protein 91 (82-103), 78.

C. A. 39, 961 (1945).

-N-

(344) Narayanamurti, D., Ranganathan, V., and Chaudhuri, P. K. B. R. Adhesives. I. Groundnut Protein Adhesives for Plywood. Forest Research Inst., Dehra Dun, Indian Forest Leaflet No. 15, 1942. 9 pages. - Eight formulas are given for adhesives based on groundnut proteins. Adhesion data obtained with plywoods indicate that satisfactory H_2O resistance can be obtained.

C. A. 38, 5615 (1944).

(345) Narayanamurti, D. and Singh, K. Adhesives. II. Groundnut Protein - HCHO Dispersions as Plywood Adhesives. Forest Research Inst., Dehra Dun, Indian Forest Leaflet No. 16, 1942. 13 pages. - Tabulated data show the effect of the adhesive strength of adding also CH_2O under various conditions of protein: CH_2O ratio, temperature of pressing, etc.

C. A. 38, 5615 (1944).

(346) Newton, H. P., "Southern Regional Research Laboratory through the War and Now." Cotton and Cotton Oil Press 47, No. 16, A3, A5-6 (1946). - The role of the Southern Regional Research Laboratory in southern agriculture and industry is discussed. The Laboratory's wartime research program is reviewed and emphasis is put upon the peacetime significance of the results accomplished.

S. R. R. L. 1946.

(347) Newton, R. C., "Review of Scientific Literature on Fats and Oils for 1934." Oil and Soap 12, 106-21 (1935). - Bibliography and abstracts on following subjects: Legislation and Statistics, Commercial Treatment of Oils and Fats, Edible Fats and Oils in Relation to Cookery, Deterioration of Oils and Fats, Characteristics of Fats and Oils, Physical Tests, Food Value and Physiological Effect, Soap,and Other Detergents.

M. B.

(348) Newton, R. C., "Review of Scientific Literature of Fats and Oils for 1935." Oil and Soap 13, 89-98, 114-26 (1936). - Similar to Reference 347, but for 1935.

(349) Newton, R. C., Mattill, H. A., Jamieson, G. S., and Greenbank, G. R., "Review of Scientific Literature on Fats and Oils for 1936." Oil and Soap 14, 59-71, 88-103 (1937). - Similar to Reference 347, but for 1936.

-O-

(350) O'Hara, L. P. and Saunders, F., "Proteins. VI. Solubility of the Nitrogeneous Constituents of Certain Seeds in a Sodium Chloride Solution." *J. Am. Chem. Soc.* *59*, 352-54 (1937). - The amount of N material extracted from flaxseed, orangeseed, peanut, and rye meals by saturated solution is almost as large as that extracted by *N* solutions. In those seed meals for which this conclusion is valid, the material which is extracted appears to consist almost wholly of a crystalline or semi-crystalline protein having the characteristics of a globulin. When a solution of given concentration is used for the extraction of N material, a marked temperature coefficient is found: with 4 *N* NaCl: 39.7°, 48.65%; 26°, 41.43%; -2.5°, 35.92%. The ordinary textbook definitions of globulins do not adequately consider the solubility properties of these compositions. Data are given for concentrations of NaCl from 0.125 *N* to saturation.

C. A. *31*, 2243 (1937).

(351) Okano, K. and Ninomiya, M., "Denaturing of Protein of Soybean by Alcoholic Extraction." *Rept. Central Lab. S. Manchuria Railway Co.*, 7-9 (1929). - Alcoholic extraction decreases the H_2O-solubility and NaCl-solution solubility, and increases the NaOH-soluble protein. No difference in the amino acids of the original and extracted products was found.

C. A. *25*, 1694 (1931).

(352) Oktomo, S., "Bean Industry in Manchuria." *Contemporary Manchuria* *1*, No. 1, 15-42 (1937).

(353) Oktomo, S., "Studies on the Alcoholic Extraction of Soybean Oil." *Contemporary Manchuria* *1*, No. 3, 83-101 (1937).

(354) Oktomo, S., "On the Proteins and Vitamins in the Embryo of the Soyabean." *Rept. Centr. Lab. South Manchuria Ry. Co.* *14*, 15-17 (n. d.).

(355) Olcott, H. S. and Fontaine, T. D., "Composition of Cottonseeds. I. Solubility of Nitrogenous Constituents." *J. Am. Chem. Soc.* *61*, 2037 (1939). - Cottonseed meal, extracted with Et_2O for 36-72 hours and air-dried, contains 9% H_2O, 8.6% N, 0.5% Et_2O-soluble lipides, 2% $CHCl_3$-soluble lipides, and 7.5% ash. NaCl (0.5 *N*) without agitation extracted 73.6% of the N in 30 minutes and 78.2% in 180 minutes; the N extracted by H_2O and 0.5 *N* NaCl at 0, 25, and 50° C. was 26, 55.2; 28.3, 79.7; 29.8, 81.9%. Of the H_2O-soluble N, a large part is present as an undescribed protein, to be reported later. The effect of a number of salts on peptization of cotton proteins is given in a series of tables; NaF and KF extracted smaller amounts of proteins than did the other neutral salts. The comparatively high yields obtained with Ca and Mg halides as compared with NaH_2PO_4 suggest that, at least within a limited range, pH is not an important factor in salt peptization; on the alkaline side Na_2HPO_4 and $NaHCO_3$ were no more effective extractants than the neutral salts. The effect of concentration on the extraction of proteins from Et_2O-extracted meal by NaCl (0.1 to 5 *N*) and Na_2SO_3 (0.15 to 1 *N*) and from commercial meal by NaCl (0.1 to 5 *N*) is also reported. In the presence of 0.5 N NaCl the amount of protein extracted is constant throughout most of

the alkaline range. Only above pH 11 does the curve rise slightly. Apparently, in the presence of salt the solubility of the glutelin fraction is depressed. The effect of salt in depressing the pH of cottonseed protein solution, especially in the alkaline range, is marked.
C. A. 33, 7848 (1939).

(356) Olcott, H. S., "Solvent Extraction of Cottonseed Oil. Effect of Cooking on Yield." Ind. Eng. Chem. 33, 611-15 (1941). - The economic feasibility of solvent extraction of cottonseed oil is discussed. The 6% residual oil in press-cake could be largely removed by solvent extraction. Gossypol is detoxified by the cooking process universally used prior to expressing oil by usual methods, and the residual cake and meal are excellent stock feed. Extraction of crushed cottonseed meats with hexane or other aliphatic hydrocarbons leaves most of the gossypol unchanged in the cake. Extraction with Et_2O, aromatic, or chlorinated solvents removes the gossypol with the oil and the resulting meal is particularly good as feed since proteins and enzymes have not been broken down by heat. Hexane-extracted meal followed by extraction with a solvent for gossypol could be used if a market for gossypol developed. Hexane-extracted meal can be detoxified by autoclaving, but the meal does not have the high biological value of unheated gossypol-free meal. If hexane is to be used the most satisfactory process involves detoxification of the gossypol before extraction. This can be accomplished by cooking the crushed meats with steam according to the methods now used in all oil mills. The resulting oil can be handled exactly as expressed oil. Solvent-extracted oil is equal in color, free fat acid, and bleach to expressed oil.
C. A. 35, 4621 (1941).

(357) Olcott, H. S. and Fraenkel-Conrat, H. L., "Water Resistance of Proteins." Ind. Eng. Chem. 38, 104-06 (1946). - Cattle hoof, feather, hoghair, peanut, and egg-white proteins, and gluten, casein, and zein were treated with a number of organic reagents to improve their water resistance. Disks were pressed from two-g. samples of the reaction products (after drying at 50° for one day) at 10,000 lb. per sq. in. and 160° for 6 minutes; these were immersed in water for 24 hours, the increase in weight measuring their affinity for water. Formaldehyde, acetaldehyde, glyoxal, ketones, aliphatic acid anhydrides and acid chlorides, ethylene and propylene oxides, epichlorhydrin, HNO_2, H_2O_2, Me_2SO_4, diazomethane, and diazobutane did not lower the water absorption of egg white and hoof powder. Quinone and $K_2Cr_2O_7$ after reaction with hoof powder gave a product with 5% water absorption but dark color; the reagents appeared to be continually leached by washing with water. Organic isocyanates and aromatic anhydrides produced the most pronounced changes. For PhNCO, the reagent of this group giving products with the smallest water absorption, 1-5%, the following procedure was used: a sample of dried protein was treated with an equal amount of PhNCO and 2.5-fold amount of dry pyridine at 70° for 1-2 days. Solution was not affected. Dry toluene was added, the protein separated by filtration, washed and extracted with EtOH, and then dried at 50° to give 120-150% yields based on the protein. Other isocyanates used were p-biphenylyl, o-biphenylyl, o-cyclohexylcyclohexyl, 2-anthryl, p-cetylphenyl, and the biisocyanates prepared from benzidine and p-phenylenediamine. Phthalic anhydride, benzoic anhydride, and benzoyl chloride gave products of low water absorption with cattle-hoof and egg-white protein. These protein derivatives of low water absorption showed a tendency to plastic flow without the addition of water as plasticizer. C. A. 40, 1349 (1946).

(358) Olier, A., "Development in Continuous Solvent Extraction Apparatus." Bull. Mat. Grasses Inst. Colonial Marseilles 21, 138 (n. d.).

(359) Oppen, F. C., "An Efficient Laboratory Extraction Apparatus." Ind. Eng. Chem., Anal. Ed. 8, 110-11 (1936). - A glass apparatus for extraction of large amounts of material is described.

C. A. 30, 3801 (1936).

(360) Osburn, J. O. and Katz, D. L., "Structure as a Variable in the Application of Diffusion Theory to Extraction." Trans. Am. Inst. Chem. Engrs. 40, 511-31 (1944). - The application of diffusion theory to solvent extraction from a porous solid has been expanded to include the structure of the solid. It is shown that different structures may produce wide variations in the type of theoretical extraction curve. Extraction data for different materials can be compared only when details of structure of the solid are compared. Extraction curves for the extraction of soybean flakes are similar to theoretical curves for extraction with 2 different diffusion coefficients. A method is shown for finding the 2 coefficients from the extraction curve.

C. A. 39, 3 (1945).

-P-Q-

(361) Palkin, S., "Simple Device for Adjusting the Siphoning Column of the Soxhlet Extraction Apparatus." *J. Am. Pharm. Assoc.* *13*, 319-20 (1924). - The apparatus consists of a cylindrical plug having a conical top and conical bottom with a hole in the center lengthwise. The plug may be made of glass or non-corrosive metal. To use the apparatus the thimble is cut to the proper size and the plug placed above with the conical end fitting into the thimble. The advantages are smaller volume of solvent required and more frequent siphonation.

C. A. *19*, 751 (1925).

(362) Payne, D. S., "Development, Manufacture, and Utilization of Peanut Flour." *Chem. Eng. News* *20*, 1173-74 (1942). - Peanut flour, prepared by expeller or hydraulic press or by solvent extraction from thoroughly cleaned raw material, can be sized by air flotation. Tentative specifications for the product require freedom from hulls, skins, and foreign material, light color, freedom from bitter or raw taste, less than 3% fiber, 5 to 9% fat, more than 55% protein with content specified, not more than 10% moisture, and 95% passing through 120-mesh U. S. standard screen. The high content of good-quality protein, as well as the good vitamin and mineral content of the flour makes it a valuable low-cost food, comparing favorably with soybeans.

C. A. *36*, 7157 (1942).

(363) Payne, D. S. *Peanut Oil--Its Chemical and Physical Properties, Present Uses, and Possibilities for Extended Uses.* National Peanut Council Yearbook 1942. Pages 103-06.

(364) Pfander, A., "Oil Extraction by the Diffusion (Solvent) Method." *Fette u. Seifen* *43*, 137-39 (1936). - General discussion on the steam, power, and solvent economy of the extraction processes.

O. & S. *14*, 61 (1937).

(365) Pian, J. H. C., "Biological Value of the Proteins of Mung Bean, Peanut and Bean Curd." *Chinese J. Physiol.* *4*, 431-36 (1930). - The biological values, determined on rats, of the proteins of mung bean (*Phaseolus aureus*), Chinese peanut (*arachis hypogaea*), and curd made from soybean are 58, 59, and 65%, respectively, and the coefficients of digestibility (N absorbed/N intake) 86, 95, and 96%, respectively.

C. A. *25*, 3378 (1931).

(366) Pickett, T. A. *Some Effects of Heat-Treatment of Peanuts.* Ga. Agr. Expt. Sta. Circ. No. 142, 1943. 8 pages. - Peanuts heated in ovens at temperatures of 130° or less even for considerable lengths of time never developed a flavor acceptable for a roasted product. Roasting at 150° for 40 minutes yielded a product with well-developed color and flavor, with little dextrinization, and only a slight loss of total sugars. The digestibility of the proteins was probably little affected (*cf.* Holmes, *C. A.* *12*, 2605). More severe heat-treatment broke down the sugars, the proteins were denatured, and the product was very dark. Inasmuch as denaturation of the proteins took place within 30 minutes at 120° in steam in a pressure cooker,

only small tolerances in the cooking treatment are allowable if millers who use the hydraulic process are to produce a uniform product.
C. A. 38, 4057 (1944).

(367) Pishiwikar, D. G. and Shah, S. V., "The Oil From the Seeds of Sivietenia Mahagoni." J. Univ. Bombay 15, Sect. A, Pt. 3 (Science No. 20), 17-20 (1946). - The saponifiable portion of the oil extracted by ether from the seeds of Sivietenia mahagoni gave acids found to consist of 18.44% stearic acid, 9.48% palmitic acid, 56.01% oleic acid, and 16.07% linolenic acid.
C. A. 41, 6067 (1947).

(368) Piskur, M. M., "Review of Scientific Literature on Fats and Oils for 1937." Oil and Soap 15, 89-102, 123-32 (1938). - Bibliography and abstracts under the following headings: Introduction, Commercial Treatment of Fats and Oils, Products Derived from Fats and Oils, Biochemical, Deterioration of Fats and Oils, Composition and Characteristics, and Detergents.
M. B.

(369) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1938." Oil and Soap 16, 73-83, 86-100 (1939). - Similar to Reference 368, but for 1938.

(370) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1939." Oil and Soap 17, 161-83 (1940). - Similar to Reference 368, but for 1939.

(371) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1940." Oil and Soap 18, 137-45, 159-72 (1941). - Similar to Reference 368, but for 1940.

(372) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1941." Oil and Soap 19, 45-53, 63-79 (1942). - Similar to Reference 368, but for 1941.

(373) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1942." Oil and Soap 20, 36-46, 58-71 (1943). - Similar to Reference 368, but for 1942.

(374) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps for 1943." Oil and Soap 21, 65-72, 108-23 (1944). - Similar to Reference 368, but for 1943.

(375) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps. Fat Literature Review Committee." Oil and Soap 22, 69-77, 84-100 (1945). - Similar to Reference 368, but for 1944.

(376) Piskur, M. M., "Review of Literature on Fats, Oils, and Soaps; Report of the Literature Review Committee." Oil and Soap 23, 113-23, 151-67 (1946). - Similar to Reference 368, but for 1945.

(377) Piskur, M. M., "Annual Review of Literature on Fats, Oils, and Soaps. Report of the Literature Review Committee." J. of the Am. Oil Chem. Soc. 24, 117-27, 160-79 (1947). - Similar to Reference 368, but for 1946.

(378) Pitman, G., "Ether Extract Method for Paste-Like Samples (Olive-Pomace Pastes, etc.)." J. Assoc. Off. Agric. Chem. 15, 299-304 (1932). - The paste is placed in 3 layers between sheets of tared filter paper, dried in a vacuum oven at 72° for 16 hours, and extracted with light petroleum for 16 hours. Br. A. B, 513 (1933).

(379) Podol'skayo, M. Z., "Rapid Determination of Free Gossypol in Cottonseed, Cottonseed Cake and Meal, and of an Unchanged Gossypol in Cottonseed Oil." J. Applied Chem. (U. S. S. R.) 17, 657-58 (1944). - A 2-g. sample of ground seed is extracted with Et_2O in Soxhlet apparatus for 10-11 hrs.; the filtered extract is freed from solvent and treated with refined cottonseed oil (other vegetable oils can be used, if they contain no substances which reduce Fehling solution) (7-8 cc.), 10 cc. 1.2% NaOH, 20-cc. portions of Fehling solution components, and the mixture is then agitated and warmed at such a rate that the first bubbles begin to appear in 3-3.5 minutes; after boiling for 3 minutes and standing for 3 minutes the precipitate is filtered, washed with petroleum ether-EtOH or Et_2OH-EtOH, then with hot water; after solution of the precipitate in Fe sulfate it is titrated with $KMnO_4$ to obtain "free" gossypol in the seed; to obtain this determination in cake or meal, the materials are ground to pass a 1-minute sieve and 10-30 g. samples are extracted with Et_2O for 20 hrs. after addition of a little water to the extraction flask. The rest of the determination is as above. Unchanged gossypol in oil is determined by treating a 1.0-1.5 g. sample with 10 cc. 1.2% NaOH and 20-cc. portions of the Fehling solution components. The determination is then conducted as above. The following table was worked out for relation of gossypol (mg.) and Cu (mg.): 5, 4.8; 10, 9.5; 15, 14.7; 20, 21.3; 25, 30.5; 30, 33.4; 35, 42.8; 40, 51.3. Results are close to those obtained by the aniline-pyridine method.
C. A. 40, 2321 (1946).

(380) Pollard, E. F., Vix, H. L. E., and Gastrock, E. A., "Solvent Extraction of Cottonseed and Peanut Oils. Boiling Point-Vapor Pressure-Composition Relations for Miscellas of Oils in Hexane." Ind. Eng. Chem. 37, 1022-26 (1945). - Boiling point and d. were determined for mixtures of cottonseed and peanut oils with commercial hexane. The b.p.'s cover the range of pressures from 160 to 760 mm. absolute. C. A. 40, 1052 (1946).

(381) Pominski, J., Molaison, L. J., Crovetto, A. J., Westbrook, R. D., D'Aquin, E. L., and Guilbeau, W. F., "Solvent Extraction of Cottonseed and Peanut Oils. IV. Pilot-Plant Batch Extractions." Oil Mill Gaz. 51, No. 12, 33-39 (1947). - A portable batch solvent-extraction plant and appratus used at the authors' laboratory are described in detail. Some data on the use of this plant for extraction of cottonseed, okra seed, and rice bran oil are tabulated. Hexane and Et ether were the solvents used.
C. A. 41, 6067 (1947).

(382) Porchez, Georges, "Solvent Losses in Extraction." Corps Gras, Savons 1, 43-47 (1943). - A discussion of the importance, origin, and methods of prevention of solvent losses in oil extractions.
C. A. 40, 4900 (1946)

(383) Porchez, Georges, "The Distillation of Miscellas." Corps Gras, Savons 2, 72-76 (1944). - From work on distillation of miscellas of oleaginous seeds, Porchez found that evaporation of from 10 to 50% oil by a multiple effect system followed by steam distillation under vacuum was most economical. The multiple effect system was described as one designed to use the heat in the vapors produced under high pressure distillation to evaporate the solvent under low pressure.

J. A. O. C. S. 24, 119 (1947).

(384) Powell, E. L. and Cameron, F. K., "Recovery of Oil from Whole Cotton." Ind. Eng. Chem. 34, 358-59 (1942). - The authors showed that solvent recovery of suitable oil from the whole cotton plant was possible if the raw material was first treated with sulfides or sulfites. After bleaching the oil with standard absorbents it met standard specifications.

O. & S. 20, 39 (1943).

(385) Price, D. J. and Brown, H. R., "Explosions in Soybean Plants." Safety Engineering 71, No. 1, 79-82 (1936). - Reports of two major fires in solvent extraction plants where hexane was employed as the solvent material to extract oil from the bean flakes. Recommendations for safety measures are given.

M. B.

(386) Price, D. J. and Brown, H. R., "Glidden Soybean Plant Explosion." Nat'l Fire Prot. Assoc. Quart., 1-9 (January, 1936).

(387) Price, D. J., "A Rural Soybean Plant Explosion." Nat'l Fire Prot. Assoc. Quart., 9-12 (January, 1936).

(388) Privett, O. S., McFarlane, W. D., and Gass, J. H., "Studies on the Heat Polymerization and Solvent Segregation of Vegetable Oils." J. Am. Oil Chemists' Soc. 24, 204-09 (1947). - The heat of polymerization of linseed oil was studied under conditions of low temperatures 260-275° C., and the removal of volatile decomposition products by the continuous passage of CO_2. These conditions minimize side reactions due to decomposition products and permit detailed analyses of the primary polymerization reactions. The results of physical and chemical analyses indicate that polymerization proceeds according to the level of unsaturation in the triglyceride molecules. The most highly saturated are polymerized first, followed in order of decreasing saturation. Thus a well-defined sequence of reactions takes place to form dimers, trimers, tetramers, etc. The results are of practical significance, since they indicate that under the prescribed conditions of heat polymerization a high degree of selectivity can be achieved in solvent segregation to provide a series of oils with a wide range of properties. Segregation with acetone yields a nonpolymer fraction suitable for the manufacture of an edible shortening, a low-polymer fraction with the desired properties of a drying oil, and a high-polymer fraction suitable as a varnish ingredient. Twelve references.

C. A. 41, 4935 (1947).

(389) Puig, J. B., "Extraction of Oil from Cottonseed." Ion 6, 245-55 (May, 1946).

(390) Punnoose, T. V., "Random Review of Textile Progress." Indian Textile J. 55, 929-30 (1945). - Ardil, a new synthetic protein fiber, nylon, and Amioca starch for sizing, finishing, printing, etc., are reviewed.
C. A. 40, 468 (1946).

(391) Quick, A. J., "A Continuous Extractor." Ind. Eng. Chem., Anal. Ed. 5, 76 (1933). - A continuous extractor is described for use in analysis of biological fluids such as urine and blood filtrates.
M. B.

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(392) Ramarao, G., "The Recovery and Use of Agricultural Wastes, I. The Destructive Distillation of Cashew Nut Shells, II." Ind. & News Ed., J. Indian Chem. Soc. 1, 137-41 (1938). - A ton of groundnut shells on an average yields 7400 cu. ft. of gas of a heating value equivalent to one and one-third cwt. of the local coal, 42 lb. of AcOH, 13 lb. of MeOH, 200 lb. of tar, and 740 lb. of charcoal. A ton of cashew shells on an average yields 6000 cu. ft. of gas of a calorific value which compares very favorably with coal gas. The charcoal whose yield is one-third of the weight of the shell has a calorific value equal to that of the local coal. Its use as a smokeless fuel for domestic heating is suggested.

C. A. 33, 3563 (1939).

(393) Ramseyer, D. R., "Ford Develops Soybean Upholstery Fiber." Soybean Digest 1, No. 11-12, 18 (1941). - The process developed by the Ford Motor Company involves (1) extraction of the oil, (2) extraction of the protein from the oil-free meal and purification of the protein by precipitation with acid, (3) dissolving the protein to produce a viscous, stringy solution and spinning this solution into a fiber, (4) after-treating to set the fibers and drying, and (5) spinning the fibers into yarn.

C. A. 36, 1782 (1942).

(394) Rao, S. and Rao, J. V., "Free Fat Acids in the Cake of *Pongamia glabra*." J. Indian Chem. Soc. 17, 526-27 (1940). - Extract of the seed cake of *Pongamia glabra* with petroleum ether gave a colorless waxy substance (0.7%) consisting of karanjin and a mixture of almost completely saturated acids with a mean molecular weight of 345.5, consisting primarily of arachidic and lignoceric acids with possibly a small amount of behenic acid. This finding explains the difference in results obtained by previous workers on the expelled oil (C. A. 17, 3616) and solvent-extracted oil (C. A. 5, 219) since the acids which exist in the free state in the seed are retained largely by the cake on pressing, whereas they are present in the oil obtained by solvent extraction.

C. A. 35, 2020 (1941).

(395) Rapoport, I. A., "The Use of Dichlorosthane in Extraction Processes." Khim. Referat Zhur., No. 3, 88-9 (1940); Sbornik Dikhloretan, 52-91 (1939). $C_2H_4Cl_2$ can be substituted for gasoline in the extraction of oils. Substances containing large amounts of oil and *Ricinus communis* (whose oil is very viscous) must be extracted at higher temperatures. Under semi-plant conditions the extraction with $C_2H_4Cl_2$ is faster than with gasoline. Extraction of bones with $C_2H_4Cl_2$ is better at higher temperature. $C_2H_4Cl_2$ is a good solvent for extracting asphaltites from bituminous minerals. It can also be used for extracting montan wax from brown coals. Better results are obtained with a mixture of alcohol and $C_2H_4Cl_2$ than with the components used separately. Montan wax is best extracted at 60°. Extraction with $C_2H_4Cl_2$ did decrease the fuel value of the coal. Montan wax extracted with $C_2H_4Cl_2$ has a normal melting point and acid number, but a slightly higher than normal saponification number. $C_2H_4Cl_2$ can also be used for extracting S from poor ores, alkaloids from plants, rosin from stumps, and paraffin from mineral oils. Corrosion of apparatus by $C_2H_4Cl_2$ is very slight.

C. A. 36, 4225 (1942).

(396) Ravenscroft, E. A., "Extraction of Solids with Liquids. Multiple and Countercurrent Extraction." Ind. Eng. Chem. 28, 851-56 (1936). - A complete graphical solution of problems involving the multiple and continuous countercurrent extraction of solids with liquids is presented including the case of extraction with varying entrainment.
C. A. 30, 5463 (1936).

(397) Rendell, L. P., "Nylon and Other Auxiliary Fibres." Textile J. Austral. 20, 175-76 (June 20, 1945). - Includes discussion of Ardil and rayon.

(398) Richards, W. A., "The Outlook of the Peanut Industry." Peanut J. and Nut World 24, No. 7, 29 (1945).

(399) Richert, T. G., "Oils, Their Production and Consumption." Oil and Soap 12, 148-52 (1935). - Statistics are given for the world's production of fats and oils, cotton, flaxseed, soybeans, and peanuts. Equipment and methods used by the Hansa Mills of Germany, pioneers in the field of solvent extraction of soybean oil, are described. Valuable by-products of the process are soybean meal and lecithin.
M. B.

(400) Richet, H., Ragot, S., and Paquot, C., "Solvent Extraction of Rapeseed (Colza) with Different Solvents." ITERG (Bull. Mens. d'Inform.) 1947, No. 4, 24-25. - The authors extracted colza seed with fifteen different solvents under identical conditions. So far as solvents with good solubility for oils are concerned the yields varied between 50.1% (toluene) and 46.2% (petroleum ether); EtOH gave 33.0%, MeOH 12.8%. Acid values of the extracted oils were between 2.7 (benzene) and 7.6 (Me acetate); saponification values between 170.4 (propyl alcohol) and 182.4 (toluene); iodine numbers between 82.1 (butyl oxide) and 98.5 (acetone and CCl_4). In order to obtain reliable results it is essential to exclude humidity during extraction and to use dried seeds and solvents, if solvents miscible with water are employed. Water alone gave as much as 10% extraction (glucides and fatty acids). Prolonged exposure to 105° of the extracted oil before weighing raises the saponification value up to 230 and lowers the iodine value to 50.
C. A. 41, 6067 (1947).

(401) Rose, W. G., Freeman, A. F., and McKinney, R. S., "Solvent Extraction of Tung Oil." Ind. Eng. Chem. 34, 612-14 (1942). - The authors proposed recovery of the residual oil from tung oil press-cake. The extracted oil solidified through isomerization to solid β-eleostearin, but was rendered permanently liquid by heating at 200° for 30 minutes.
O. & S. 20, 39 (1943).

(402) Rosenthal, H. and Trevithick, H. P., "Low-Boiling Hydrocarbons as Oil-Extraction Media." Oil and Soap 11, 133-34 (1934). - As solvents such as propane and butane are gases at ordinary temperatures, they must be kept under increased pressure during extraction. Under these conditions only the true fixed oils are removed from the seed. All the tests that have been made with these solvents gave light-colored oils, refining with low losses and good flavor. Solvent is easily removed at atmospheric pressure or low-

er with slight elevation of temperature with agitation. The meal can be completely freed of these solvents on a belt traveling in a current of warm air. C. A. 23, 5267 (1934).

(403) Rosenthal, H. and Trevithick, H. P., "Extraction of Cottonseed Oil with Liquid Carbon Dioxide." Oil and Soap 17, 264 (1940). - It was demonstrated by three methods that liquid CO_2 has no solvent power for cottonseed oil: (1) the lack of change in weight of the sample of meats used; (2) the identical analyses of the meats before and after the test, and (3) the fact that no oil was recovered from the CO_2.

C. A. 35, 923 (1941).

(404) Rousseau, P. M., "Special Methods of Extraction and of Continuous Extraction of Olive Oil." Fruits et Primeurs de l'Afrique du Nord 13, 184-87 (November, 1943).

(405) Rozanov, V. N. and Smirnova, N. V., "Recovering Protein from Press-Cake." Schr. Zentr. Biochem., Forschungsinst. Nahr.-Genussm., U. S. S. R. 1, 301-08 (1932). - Use of 0.5-1.5% NaOH or KOH, followed by precipitation with HCl, is recommended. The aqueous NH_3 method is not economical.

Br. A. B, 426 (1934).

(406) Ruiz, A. S. and Munoz, M. S., "Spanish Grape-Seed Oils." Ion 2, 279 (1942). - Fourteen Spanish grape-seed oils were examined for moisture content of the seed, comparative yield on extraction with Et_2O, CS_2, MeOH, $CHCl_3$ or petroleum ether, and several analytical constants. An oil from Rio Zancara gave the following results: moisture 8.42%, yield on Et_2O extraction 8.18%, d_{20} 0.9318, n^{40} 1.4681, saponification number 19.46, acetyl number 35.04, Henner number 90.56, Reichert-Meissl number 4.12, I number 122.20, acid number 106.16, free fat acid 53.35%, unsaponifiable 3.38%. The fat acids of the oil had the constants: acid number 192.27, d_{20} 0.9194, n^{25} 1.4725, n^{40} 1.4649, I number 97.67, m. 24° C., acetyl number 39.8, molecular weight 291.8. The unsaponifiable gave negative color tests for provitamin A, vitamin D, vitamin E, and cholesterol, but contained 14.81% of other sterols. Chromatographic adsorption separated the unsaponifiable into 4 zones. α-Sitosterol was isolated after crystallization from petroleum ether, m. 134-136° C., acetate m. 126-7° C. The other fractions from chromatographic adsorption were identified by ultraviolet adsorption spectra as dihydroergosterol, ergosterol, β-amyrin, and traces of vitamin E.

C. A. 37, 1286 (1943).

(407) Rushton, J. H., "Countercurrent Liquid-Liquid Extraction in a Packed Tower." Ind. Eng. Chem. 29, 309-18 (1937). - Data on countercurrent liquid-liquid extraction in a packed tower are presented and evaluated by means of laboratory batch countercurrent extractions in terms of equivalent theoretical stages (E. T. S.) and over-all percentage efficiency of the solvent (% eff.). A direct method for evaluating a tower extraction and relating it to equilibrium data of a 3-component system is discussed and presented in the form of an extraction chart. Conclusions (valid for the particular oil-solvent system used): there is little difference in extraction with glass, stoneware, or C of equivalent size as tower packing. There is a limit to the amount of oil that can be handled by a given size of packing. Throughput is lower but extraction is better with small-sized packing.

Graded packing (larger at the bottom and small at the top) gives better results than uniform packing. Recirculation of extract and mixing it with incoming oil increases the oil throughput and the E. T. S. Settling spaces required are small and are dependent on the size of packing nearest the space. For a given height of packing, as the solvent ratio increases the E. T. S. and the percentage efficiency both decrease. The effect is greater on the E. T. S. For a given height of packing, as the oil rate increases the E. T. S. decrease and the percentage efficiency increases. The effect is greater on the E. T. S. Low interface levels (or large continuous raffinate phase) give highest E. T. S. and percentage efficiency. Preferential wetting of the packing seems to have no appreciable effect on the extraction. Fourteen references.

C. A. 31, 2868 (1937).

(408) Ruthruff, R. F. and Wilcock, D. F., "Solvent Extraction of Vegetable Drying Oils." Trans. Am. Inst. Chem. Engrs. 37, 649-67 (1941). - The use of selective solvents to obtain from soybean oil a fraction more highly unsaturated than the original oil has been investigated. Furfural was found to be the most suitable selective solvent of those examined. Batch extractions demonstrated that extracts of about 145 I number and the equilibrium curve from which the characteristics of multistage extractions can be deduced have been derived from batch extraction data. Comparable results were obtained in the extraction of linseed oil with furfural. Drying tests show that the extracts contain both natural antioxidants and antioxidants owing to traces of furfural or decomposition products thereof. To eliminate these, a predominantly paraffinic hydrocarbon solvent is employed to extract the oil of high I number from the furfural-extracted oil mixture; this eliminates the distillation of furfural and hence the formation of furfural antioxidants in the furfural. A flow sheet for one form of this plural extraction process is shown in which an antioxidant-free extract is produced, the natural antioxidants being concentrated in the raffinate, where they are not undesirable, while the formation of furfural antioxidants is eliminated as previously described.

C. A. 35, 7734 (1941).

(409) Ryadovoi, V., "The Effect of Gossypol on the Unaccountable Loss of Oil in the Production." Masloboino Zhirovoe Delo 13, No. 6, 25-26 (1937). - The discrepancy of about 1% between the contents of oil in the seed meals as determined by the extraction with Et_2O and petroleum ether and the production yields of oil was traced to the difference between the contents of gossypol in the solvents (0.6-0.77%) and in the processed oil (0.007%). Since the press-cakes contain no gossypol, it is evident that during the roasting process the gossypol in seed meal becomes insoluble by combining with the albuminous products. To obtain related values the crushed seeds before testing should be dried at 100-5° for two hours.

O. & S. 15, 191 (1938).

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(410) Salkin, R. and Kaye, I. A., "Large-Size Laboratory Soxhlet Extractor." Ind. Eng. Chem., Anal. Ed. 18, 215-16 (1946). - A new Soxhlet-type laboratory oil extractor has a capacity of 25 to 30 pounds of raw material; thus large samples of fat are available for research.

J. A. O. C. S. 24, 168 (1947).

(411) Sato, M. and Sakai, H., "Extraction of Soybean Oil with Alcohol. II. 1. Solubility of Soybean Oil in Alcohol. 2. Experiments on the Extraction of Soybean Oil with Alcohol." Rept. Central Lab. S. Manchuria Railway Co. 1-6 (1929). - (1) The solubility of soybean oil in alcohol of various concentrations; in alcohol diluted with C_6H_6, benzine, or oleic acid; in MeOH; and in MeOH diluted with C_6H_6 has been determined. (2) The optimum conditions are 2 extractions with alcohol (96% by volume) for two hours at 75° or above. The extract cooled to 25° deposits the oil. Extraction above the b. p. gives better results. An apparatus is described. Yields are equal to those with benzine; the product is edible.

C. A. 25, 1694 (1931).

(411A) Sato, M., Kitagawa, K., and Inaba, T., "Alcohol-Extracted Soybean Oil. II. Changes of Properties and Compositions by Ultra-Violet Light. III. Effect of Ultra-Violet Light in Oxygen, Hydrogen, and Nitrogen Atmosphere." J. Soc. Chem. Ind. Japan (Suppl. Binding) 37, 372-47 (1934). - Alcohol-extracted and benzine-extracted, pressed oils both crude and purified, were exposed to the ultra-violet light (Hg-quartz lamp) for 60 hours. After 20 hours' exposure alcohol-extracted and purified pressed oil were almost water-white, while it took 35 hours to decolorize crude pressed oil and benzine-extracted oil. Red color was bleached more easily than yellow. Sp. gr., relative viscosity, and n increased with the duration of exposure, the gradient becoming sharp after 50 hours. For the first 30 hours the acid values remained constant but became 4 to 15 times the original values after 60 hours, reaching values of 4.5 to 5.5 irrespective of the differences in original values. The I numbers did not change for 15 hours for alcohol-extracted and pure pressed oil, and for 30 hours for benzine-extracted and crude pressed oil. Beyond these critical points they decreased gradually. Fifty hours' exposure produced a substance soluble in petroleum ether, reaching 10-16% after 60 hours. After 55 hours water-insoluble acids decreased by 2-5% and insaponifiable matter increased 0.4%. The O_2 content of the oils increased 4-5% after 10 hours. Both original and treated oils gave 6-7% weight increase after 33 days. No identical absorption bands were observed in the spectrum of the original and exposed oils (0.1 g. in 100 cc. ether). In general, soybean oil after ultra-violet exposure became transparent to the visible range and opaque to the invisible ultra-violet range, alcohol-extracted oil becoming the least transparent oil. III. Alcohol-extracted, benzine-extracted, and pressed oil were exposed to ultra-violet light for 100 hours, gas passing at the rate of 1 l./hr. Experimental data for I number decrease and N increase are presented. The effect of ultra-violet light upon color was found to be influenced by the gaseous atmosphere.

C. A. 28, 7046 (1934).

(412) Sato, M., Inaba, T., and Kitagawa, K., "The Alcohol-Extraction Process of Fatty Oils--Mutual Solubilities of Some Vegetable Oils." J. Soc.

Chem. Ind. Japan (Suppl. Bind.) 37, 718-21B (1934). - Solution temperature-concentration diagrams presented for mixture of EtOH with peanut oil, cotton seed oil, sesame oil. Discussion of extraction of peanut oil. Experimental results given in graphical form. C. A. 29, 1273 (1935).

(412A) Sato, M., Inaba, T., and Kitagawa, K., "The Alcohol-Extraction Process of Fatty Oils--Mutual Solubilities of Some Vegetable Oils." J. Soc. Chem. Ind. Japan (Suppl. Bind.) 38, 50B (1935). - With the alcohol extraction method the best condition for technical purposes is an alcohol concentration of about 92% by weight and 78° operating temperature. Under these conditions it is claimed that the oil and crude meal produced are superior to gasoline-extracted products, the oil being light in color, low in moisture and protein content, and almost free from fat acids.
O. & S. 13, 91 (1936).

(413) Sato, S., "Proteins of Soybeans and Their Industrial Applications." J. Chem. Ind. Tokyo 22, 851-77, 953-68, 1945-58 (1919). - I. In this and other papers to follow are described the methods of manufacture of Satolite, a substance similar to Bakelite. Included are (a) history of soybean culture in the Orient, and its uses; (b) chemical compositions of different varieties, and how to grade the beans for the industrial uses; (c) microscopic and histological studies of the bean, and (d) methods of removing the coat of the bean and destroying the cell wall for subsequent treatment. II. Careful methods of extraction of the fat without denaturing the proteins are given. Three important factors for removal of fat are the seed coat, H_2O contents, degree of dryness of the beans after the destruction of cell structure. In 32 charts, the results are tabulated for amount of fat extracted by different solvents under various conditions of above factors. III. Equipment and apparatus for fat extraction are described. For the greatest efficiency of removing fat, the following conditions are recommended: (1) remove the seed coat, otherwise 7.3% of fat will remain in the seed; (2) destroy cell structures completely; (3) maintain H_2O content at less than 13%, preventing the seed from coming in contact with the air after the cell structure is destroyed; (4) a rotatory extractor is the best; (5) use enough solvent to cover the beans; (6) revolution of the machine should be such that the beans will not be pulverized; (7) three or four extractions at 40° C. for 1-2 hours are sufficient.
C. A. 14, 2682 (1920).

(414) Sato, S., "Oil and Protein Extraction from the Soybean." Techn. Repts. Tohoku Imp. Univ. 2, 1-124 (1921). - A discussion of the soybean, its use, nature, history, statistics, and microscopy. A very detailed account is given of the commercial methods of utilizing the various useful constituents of the bean. One chapter deals with the extraction of its oils. The remainder of the pamphlet consists of a study and comparison of the various methods that may be used industrially in obtaining, extracting, and precipitating the protein content of the bean and in preparing this protein mass for use. The waste liquor from the extraction affords a non-crystallizable sirup containing sucrose and other sugars which may be used as a sweetener. Soybean oil may be used in the manufacture of soaps, paints, rubber substitutes, hydrogenated oils, etc.
C. A. 16, 1491 (1922).

(415) Scheiter, E. K. "Solvent Extraction; Newest Soybean Processing Unit of A. E. Staley Mfg. Co. Employs Latest Solvent Method for Production of

Oil and Soybean Meal." Amer. Miller and Processor 73, No. 9, 58-60, 62, 84-85 (1945). - As told to H. K. Ferguson.

(416) Schmid, A., "The Extraction Apparatus, 'System Hansa-Muhle,' Its Construction and Mode of Operation." Fette u. Seifen 46, 464-65 (1939). - The material to be extracted (e. g., oil-seed pulp) is placed in bronze mesh baskets attached to endless chains passing over 2 sets of pulleys in vertical arrangement. The baskets, after filling, first pass downward through a spray of benzine charges during the subsequent upward motion of the baskets countercurrent to a spray of fresh solvent.
C. A. 34, 7661 (1940).

(417) Schricker, J. A., "Rapid Method for the Preparation of Samples and Evaluation of Oil Quality in Small Samples of Flaxseed." Oil and Soap 23, 91-92 (1946). - In flaxseed breeding work, where meager samples are used, the seeds were ground in a small Wiley mill and extracted with petroleum ether.
J. A. O. C. S. 24, 168 (1947).

(418) Schwartz, A. K., "Solvent Extraction of the Soybean." Oil and Fat Ind. 4, 284-88 (1927). - The process described was developed in Germany and has been in operation for 10 years. It is based on the principle of continuous operation and counter-current flow and is divided into 3 semi-independent units: extraction proper, solvent recovery from extracted meal, and oil recovery of distillation unit. The extractor is a large bucket elevator, the buckets having false bottoms and filled from a hopper above the extractor, while at the highest point of their flight. They descend on the right side, being simultaneously treated with oil solvent effluent obtained from the left side of the extractor. In the ascending side the material is treated in counter-current with fresh solvent. The bucket ascending past the solvent zone goes through a draining period and upon again reaching its highest point is dumped in a hopper below, from which it is delivered up the drying apparatus. The whole is enclosed in an iron casing. The drying apparatus consists of a series of specially designed, jacketed tubes, within which the meal is heated and steamed. After traveling the full length the meal is delivered through a lock as finished meal. Evaporators, fractionating columns, heat exchangers, H_2O separator, surface condensers, and an oil scrubbing tower for solvent receovery from vented air constitute the recovery unit. A mixture of benzene and alcohol is used. The alcohol enables the recovery of vegetable phosphatides. A table of 6 months' operation is given representing 8000 tons. Extracted meal analyses 8.60 to 15.53% H_2O, 0.40 to 0.90% fat, 47.20 to 48.45% protein, 3.53 to 5.0% fiber, and 5.10 to 5.4% ash. No solvent is left in the meal and it is used for human consumption and commands a premium over pressed soy meals.
C. A. 21, 3756 (1927).

(419) Senti, F. R., Eddy, C. R., and Nutting, G. C., "Conversion of Globular to Oriented Fibrous Proteins. I. By Heat and Mechanical Working." J. Am. Chem. Soc. 65, 2473 (1943). - Numerous globular proteins were converted to the fibrous form (characterized by the diffraction pattern of β-keratin) by heating with H_2O, followed by mechanical treatment (such as stretching in cold or hot H_2O) to extend and orient the peptide chains. Among the proteins treated are casein, β-lactoglobulin, hemoglobin, ovalbumin, edestin, zein, and peanut and soybean proteins. Observed spacing and intensity

are given for lactoglobulin, ovalbumin, and β-keratin. The strength of filaments is greatly increased by conversion to the oriented fibrous form.
C. A. 38, 761 (1944).

(420) Senti, F. R., Copley, M. J., and Nutting, G. C., "Fibrous Forms from Globular Proteins." J. Phys. Chem. 49, 192-211 (1945). - Lactoglobulin, ovalbumin, casein, zein, peanut and soybean proteins, gliadin, hemoglobin, serum albumin, edestin, and tobacco-seed globulin have been converted into fibrous forms giving X-ray diffraction patterns nearly identical with that of β-keratin. The conversion is accomplished by heating the protein in the presence of water and stretching to extend and orient the chain. The extent of molecular orientation can be followed by changes in birefringence, X-ray diffraction, and swelling anisotropy. Dimensional data for protein molecules are given. The wet strength and dimensional stability of oriented ovalbumin fibers is improved by treatment with Ac_2O, HCHO, or quinone.
C. A. 39, 3798 (1945).

(421) Sharefkin, J. G. and Wolfe, J. M., "Efficiency in Extraction with Solvents." Ind. Eng. Chem., Anal. Ed. 16, 584-85 (1944). - A math treatment of the problem of multiple extractions.
C. A. 38, 5694 (1944).

(422) Sherman, J. V. and Sherman, S. L., The New Fibers. New York: Van Nostrand, 1946. 537 pages. - Contains chapters dealing with casein, soybean and other protein, rayon, and cellulosic fibers.

(423) Shinozaki, Y. and Sato, M., "Alcohol-Extracted Soybean Oil. I. Changes Due to Heat-Treatment." J. Soc. Chem. Ind. Japan (Suppl. Bind.) 37, 372 (1934). - Heat treatments at 120° to 250° were carried out on alcohol-extracted, benzine-extracted, and pressed oils. Benzine-extracted and pressed oils always show "breaking" phenomena above 180° due to the coagulation of impurities in the oil, while alcohol-extracted oils become clearer and lighter on heating. The coagulated matter on analysis gave P = 2.18% and N = 1.03% (phosphatide). Alcohol-extracted oils showed less heating loss than the others. Alcohol-extracted oil can be decolorized by heating at about 200° without any preliminary treatments such as alkaline or acid washing.
C. A. 28, 7046 (1934).

(424) Shuey, P. M., "Determination of Free Fat Acids in the Oil Extracted from Cottonseed." Oil and Soap 20, 244-45 (1943). - A comparison of the official method for extracting cottonseed oil from cottonseed meats and determining the free acid as against a beaker method of extraction was as follows: 40 g. of meats were stirred with 110 ml. of petroleum ether at 5-minute intervals for 30 minutes and then filtered and washed 3 times with the solvent and the solution evaporated. The results were identical in 75% of the cases and close in the other cases for the free fat acid determination.
C. A. 38, 501 (1944).

(425) Sieck, H., "Extraction of Spent Bleaching Materials." Oil and Soap 14, 314-15 (1937). - A solvent-extraction process, plant, and equipment are described for recovering fat from fuller's earth and C. Operating cost is

$15 per ton of spent earth handled. In this plant where corn, cottonseed, soybean, and coconut oil are handled, the color of extracted oils has been as dark as 35 yellow and 18 red, and as light as 20 yellow and 6 red. C. A. 32, 1125 (1938).

(426) Sievers, A. F. and McIntyre, T. D., "The Relative Effectiveness of Several Organic Solvents for the Extraction of Vegetable Oils." Cotton Oil Press 4, No. 10, 44-45 (1921). - To ascertain the quality of oil extracted by Et_2O, C_6H_6, CCl_4, C_2HCl_3, and light and heavy gasoline from soybeans, peanuts, corn germs, and cottonseed, such extractions were made and tested. Six portions of a sample of each of the above oil materials were extracted cold with successive quantities of the solvents, the solvents evaporated and steamed out, and the refining loss, free fatty acids, and color of the crude, refined, bleached, and deodorized oils determined. With soybeans the free fatty acids were highest in the C_6H_6 and decreased in the following order: C_6H_6, Et_2O, C_2HCl_3, CCl_4, light gasoline, heavy gasoline. The refining loss with the heavy gasoline was 8.8; with C_6H_6, 8.5; light gas, 8.4; C_2HCl_3, 8.3; CCl_4, 7.6; and 4.9 with Et_2O. The free fatty acids of all the peanut extractions were below 0.5%, varying from 0.49 for heavy gasoline to 0.21 for Et_2O. The refining losses were Et_2O, 11.8; heavy gasoline and CCl_4, 3.3; C_2HCl_3 and C_6H_6, 3.2; and light gasoline, 2.8. With corn germs the free fatty acids were C_2HCl_3, 2.37; C_6H_6, 2.29; Et_2O, 2.23; light gasoline and CCl_4, 1.90; and heavy gasoline, 1.39. Refining losses on Et_2O extract, 11.1; C_6H_6, 10.7; CCl_4, 10.0; heavy gasoline, 9.2; light, 8.6; and C_2HCl_3, 7.6. The Et_2O extract from cottonseed contained 2.61 free fatty acids; C_2HCl_3, 2.01; C_6H_6, 1.78; CCl_4, 1.36; light and heavy gasoline, 1.09. The refining losses were heavy gasoline, 13.5; Et_2O, 13.0; C_6H_6, 10.7; light gasoline, 10.6; CCl_4, 7.9; and C_2HCl_3, 6.7; C_2HCl_3 extracts the most color from soybeans, peanuts, and cottonseed, but produces lighter oil from corn germs than either C_6H_6 or heavy or light gasoline. The color of the crude oils is, however, no indication of what may be expected in the refined or bleached oils. With C_2HCl_3, for instance, the crude soy and peanut extracts were the darkest in each case, but after proper bleaching were nearly the lightest in each set. The extracted peanut oils were, after bleaching, nearly water-white in spite of the fact that the red skins were only partially removed. "It seems that the selection of solvents is almost entirely one of cost and that the question of performance is of secondary consideration."

C. A. 15, 1228 (1921).

(427) Sikka, B. N., "Recent Developments in Plastics in India. III. (4). Protein Plastics--Seeds and Seed Cakes." J. Sci. and Indus. Res. (India) 4, 731-32 (1946).

(428) Simon, P. N. and Story, F. E., Jr., "A Convenient Continuous Extractor." Chemist-Analyst 30, No. 1, 17 (1941). - A modification of the Kutscher-Steudel extractor (Z. Physiol. Chem. 29, 473) is shown and explained; it is suitable for handling large volumes of solutions.

C. A. 35, 2373 (1941).

(429) Singer, M., "The Extraction Process--The Sole Process in the Future for Producing (Fatty) Oils?" Seifensieder-Ztg. 64, 863-65, 881-82 (1937). - The advantages and disadvantages of extracting and pressing vegetable seed pulps are reviewed.

C. A. 32, 1126 (1938).

(430) Singh, C. and Singh, K. Ground-Nut Proteins in the Sizing of Paper. Indian Forest Bulletin No. 126, 1945. 13 Pages. - The following sizes were studied: free rosin-protein dispersion containing peanut protein and rosin in the proportions of 1:7, 1:5, and 1:3; combined rosin-protein dispersion ~~containing protein and~~ rosin in the ratio of 1:5, free rosin-protein size containing protein and rosin in the ratio of 1:5 (ground-nut size); the proportion of CO_2 to rosin being 0.061:1 (the protein is extracted with Na_2CO_3 preferably or with NaOH); combined rosin-ground-nut size dispersion with a protein-rosin proportion of 1:5; the Na salt of the protein and ground-nut size (the alkaline extract of peanut protein). The free rosin-peanut protein dispersions give the optimum sizing results and effect a saving of 50% of rosin and 27% alum in the use of a 0.2% protein dispersion. Combined rosin-protein dispersion also effects a saving of 50% of rosin but only 17% of alum. The use of ground-nut size alone can be used for sizing, 6% of protein being required; in this case there is no saving of alum. Semicommercial results are reported.

C. A. 40, 3260 (1946).

(431) Singleton, W. S. and Bailey, A. E., "Tocopherol Concentrates by the Fractional Crystallization of Cottonseed Oil from Solvents." Oil and Soap 21, 224-26 (1944). - The method used in preparing the tocopherol concentrates from refined cottonseed oil consisted in dissolving the fat in a solvent and crystallizing out the bulk of the glycerides at a low temperature to leave a small residue of fatty material in the solvent. This uncrystallized residue contained most of the tocopherols in the fat. Petroleum naphtha and methyl ethyl ketone were less suitable solvents than acetone, because of their greater capacity for dissolving glycerides at low temperatures.

M. B.

(432) Singleton, W. S., Lambou, M., and Bailey, A. E., "Modification of Vegetable Oils. III. Fractional Crystallization of Fatty Acids from Solvents--Separation of the Solid and Liquid Acids of Cottonseed Oil." Oil and Soap 22, 168-74 (1945). - Low-temperature crystallization from organic solvents was investigated as a means of effecting practical separations of the solid and liquid acids of unhydrogenated and hydrogenated cottonseed oils. At any fixed temperature the most efficient separations were obtained in the highly polar solvents, acetone and Me acetate. It was possible to make nonpolar petroleum naphtha (Skellysolve B) fully equivalent to the polar solvents by conducting the crystallization at a temperature approximately 10°F. lower than that for polar solvents. Et acetate and Me Et ketone were intermediate in effectiveness between the naphtha and acetone or Me acetate. By using a solvent:fat acid ratio of 4 to 1 by weight and conducting crystallizations at 5°F. or lower from acetone and -5°F. or lower from petroleum naphtha, the liquid fat acids from unhydrogenated cottonseed oil could be reduced to below -2°F. in titer and to below about 3% in saturated acid content. Under these conditions no appreciable crystallization of oleic acid resulted. At a solvent fat acid ratio of 6 to 1 and the same temperatures equally good separations could be made of the saturated acids present in the mixed acids from the fat acids of the hydrogenated cottonseed oil. Separation of isooleic acids from the fat acids of the hydrogenated oil took place over a wide range of temperatures, beginning at 35°F. in acetone and at 25°F. in petroleum naphtha and being incomplete (according to Twitchell analyses of the liquid acids) in either solvent at -15°F. The bulk of the higher-melting isooleic acids was precipitated as the temperature approached -5°F., in acetone, and -15°F. in petroleum naphtha.

C. A. 39, 3950 (1945).

(433) Skipin, A. I., "Application of the Skipin Method to Extraction of Cottonseed Oil." Masloboino Zhirovoe Delo 12, 379-81 (1936). - A factory procedure is described.

C. A. 31, 1645 (1937).

(434) Slashchev, A., "Richness of the Material and Number of Extractors in a Battery." Chimie et Industrie 29, 1406 (1932); Masloboino Zhirovoe Delo 11, 35-46 (1932). - The chief factors governing the number of extractors in a battery, the number of distilling apparati, and of condensers are: the oil content of the material to be extracted and the time required for extraction. With sunflower seed and soybean, most of the oil is extracted in 0.5-2 hours. Extraction comprises two periods: in the first, the solvent passing through the freshly charged extractor immediately comes in direct contact with the oil liberated from the seed cells; the second period corresponds to diffusion and osmosis of the solvent which must pass through the cell walls to reach the oil.

C. A. 28, 4925 (1934).

(435) Smallwood, Edward, "A Simple Large-Capacity Extraction Apparatus." Ind. Eng. Chem., Anal. Ed. 14, 899-900 (1942). - An apparatus constructed from a three-neck flask and a bell jar is described.

C. A. 37, 553 (1943).

(436) Smith, A. K., Circle, S. J., and Brother, G. H., "Peptization of Soybean Proteins. The Effect of Neutral Salts on the Quantity of Nitrogeneous Constituents Extracted from Oil-Free Meal." J. Am. Chem. Soc. 60, 1316-20 (1938). - As a preliminary to projected protein separation studies, a systematic survey has been made of the dispersing action of neutral salts on oil-free soybean meal. The following analyses of seed samples after oil extraction are given, percentage of moisture, nitrogen, oil, ash, and phosphorus being given: soybean, 9.28, 7.80, 0.35, 5.55, 0.972; flax 10.44, 6.98, 2.26, 4.59, 0.742; tepary 10.31, 4.42, 0.44, 3.18, 0.406; barley 10.47, 1.91, 0.92, 2.58, 0.177; rye 11.70, 2.31, 0.78, 1.72, 0.179; wheat 11.97, 2.23, 0.57, 1.61, 0.138. The effect of fineness of the soybean meal upon the percentage of nitrogen extracted was studied, with a Wiley mill (2 mm., 1 mm., and 0.5 mm.) and a pebble mill; data are given on the amount of nitrogen extracted by H_2O, N NaCl, N Na_2SO_4, and 0.5 N NaF, NaCl, NaBr, and NaI. The effect of the normality of the solution (from 0.001 to 3 N) was determined for LiCl, NaF, NaCl, NaBr, NaI, Na_2SO_4, $Na_2C_2O_4$, $Na_2C_4H_4O_6$,, KCl, $CaCl_2$, $MgCl_2$, and $MgSO_4$. The percentage of nitrogen extracted before and after flocculation by H_2O, $CaCl_2$, and NaCl is also given. Neutral salts disperse less of the nitrogen constituents from soybean meal and tepary meal than is dispersed by H_2O. A minimum occurs in the salt dispersion curves for soybean meal at about 0.1 N for univalent cations and at about 0.02 N for bivalent cations. The NaCl dispersion curve for the tepary bean has a minimum at 0.0357 N. The amount of protein extracted from soybean meal increases with a decrease in particle size and with an increase in the number of extractions.

C. A. 32, 5423 (1938).

(437) Smith, A. K. and Circle, S. J., "Peptization of Soybean Proteins--Extraction of Nitrogeneous Constituents from Oil-Free Meal by Acids and Bases with and without Added Salts." Ind. Eng. Chem. 30, 1414-18 (1938). - The amount of nitrogeneous matter extracted from oil-free soybean meal by HCl, H_2SO_4, H_3PO_4, trichloroacetic and oxalic acids is no greater than that

extracted by water. The common point of minimum dispersion is approximately pH 4.2. If trichloroacetic acid is to be used as a precipitant in the determination of onoprotein N, it should be used in sufficient concentration to produce a pH below 0.5. Na and Ca hydroxides are the most effective dispersing agents. Extractions made with salt solutions show that at low salt concentrations the pH has a greater influence on the amount of protein dispersed than the salt. This effect decreases with increasing salt concentration and disappears at 0.5 N. Aging of the meal decreases the amount of water-extractable N. H-ion dispersion data for wheat, tepary beans, and Alaska peas are included for comparative purposes.

C. A. 33, 1049 (1939).

(438) Smith, A. K. and Circle, S. J., "Soybean Protein. Precipitation from Water and Alkaline Dispersions by Acids and by Electrodialysis." Ind. Eng. Chem. 31, 1284-88 (1939). - Soybean protein was extracted from oil-free meal with water, 0.05 N NaOH, and 0.05 N Na_3PO_4, and precipitated by H_2SO_4 or H_3PO_4 at various pH values. The protein in aqueous dispersion was also precipitated by electrodialysis through parchment paper. In addition, one protein sample was extracted from the meal with 0.07 N HCl and precipitated by NaOH. The acids produced maximum precipitation at pH 4.0 to 4.2, the electrodialysis at pH 4.3 to 4.7. Extraction with 0.05 N NaOH and precipitation with H_2SO_4 yielded the most protein. Eighty-four per cent of the N in the meal was recovered as protein in this way. An additional 7.3% of the total N could be precipitated by phosphotungstic acid from the centrifugate after H_2SO_4 precipitation and 8.0% by tannic acid. In the precipitation of soybean protein there were no marked differences between the action of acids and of electrodialysis through parchment paper.

C. A. 33, 9480 (1939).

(439) Smith, A. K. and Max, H. J., "Soybean-Protein Dispersions in Formaldehyde Solutions. Preparation and Application." Ind. Eng. Chem. 32, 411-15 (1940). - Dispersions of soybean protein in concentrations as high as 10% were prepared in the presence of 2-10% CH_2O. The dispersions were most stable at the neutral point but can be prepared with pH values as low as 5.7. Salts, such as borax and Na_3PO_4, and low temperature-delayed gelation. Higher concentrations of the protein-CH_2O dispersions were made possible by a mild hydrolysis with dilute alkali or by the action of souring bacteria or yeast on the water dispersion of the protein. Commercial applications were found in the fields of surface-sizing glassine paper, laminated plastics, and leather dressing.

C. A. 34, 2492 (1940).

(440) Smith, A. K., Johnsen, V. L., and Beckel, A. C., "Linseed Proteins; Alkali Dispersion and Acid Precipitation." Indus. and Eng. Chem., Indus. Ed. 38, 353-56 (1946).

(441) Smith, F. H., "Column for Stripping Solvents from Extracted Oils." Ind. Eng. Chem., Anal. Ed. 14, 255 (1942). - The apparatus consists of a steam-jacketed column the inner tube of which is constricted in the middle, the constriction carrying a small glass bulb which permits a slow flow of oil and forms a seal against the passage of vapour. The oil-solvent mixture is fed down the column and air or N_2 is led up the column, the solvent being taken off at the top and the oil at the bottom. The apparatus is efficient with various vegetable oils (corn, soybean, etc.) in light petroleum or $(CH_2Cl)_2$, solvent recovery being 85-90% efficient and oil recovery quantitative.

Br. A. BII, 263 (1942).

(442) Smith, F. H., "Estimation of Gossypol in Cottonseed Meal and Cottonseed." Ind. Eng. Chem. Anal. Ed. 18, 41-43 (1946). - Cf. Boatner, Caravella, and Kyame. Gossypol obtained from cottonseed meal and cottonseed meats by means of alcohol-ether extraction in a Waring blender has been estimated spectrophotometrically from the color developed by heating after the addition of aniline. Measurements were made at 445 μ in both a Coleman double monochromator spectrophotometer and a Beckman spectrophotometer. Determinations can be made in two hours compared with 48 to 120 hours by gravimetric or other colorimetric methods. On the average, the spectrophotometric method yielded results which were about 15% lower than those obtained gravimetrically on the same samples. C. A. 40, 2321 (1946).

(443) Smith, J. C., "Ternary Systems for Extraction Calculations." Ind. Eng. Chem. 34, 234-37 (1942). - A critical survey of the literature on the solubility relations of ternary liquid systems including a list of those systems for which complete data are available is presented. Methods of construction, representation, and interpretation of triangular diagrams by means of which ternary solubility data are best represented are discussed. The determination of tie lines which are necessary for the design of extraction equipment, either by analytical methods or from the relative volume or weight of the two conjugate layers, is considered. Interpolation between tie lines is accomplished by various graphical methods. Fifty-three references. C. A. 36, 1541 (1942).

(444) Smith, J. C., "Tie Lines in Quaternary Liquid Systems." Ind. Eng. Chem. 36, 68-71 (1944). - A graphic method of solving problems in mixed-solvent extractions is given. The method involves the construction of plane graphs which permit easy and accurate interpolation between relatively few known points. C. A. 38, 912 (1944).

(445) Speakman, J. B., "Fibrous Proteins." Nature (London) 158, 473-76 (October 5, 1946). - The use of peanut protein in the preparation of fibres is mentioned.

(446) Stansbury, M. F., Guthrie, J. D., and Hopper, T. H., "Analysis of Peanut Kernels with Relation to U. S. Standards for Farmers' Stock Peanuts." Oil and Soap 21, 239-46 (1944). - Analyses made indicate that all peanuts of a given commercial type of good to fair quality, which are grown under similar environmental conditions, may be expected to yield oil and N at practically the same rate in proportion to the total percentage of kernels after shelling. The oil obtained from various lots of such peanuts may be expected to be of approximately the same quality from a refining standpoint. Reasonably small percentages of shriveled kernels do not noticeably lower the yield of oil and N, although samples composed entirely of small shriveled kernels yield only about 75% as much oil as mature kernels. Kernels of Spanish peanuts grown in Texas are higher in oil and N than those grown in Alabama and Georgia. From the data obtained it appears that 2/3 of all graded Spanish and runner peanut kernels will have oil contents between 48.9 and 52.3% and N contents between 4.64 and 5.14% on a moisture-free basis. Similarly 2/3 of Virginia peanut kernels should have oil contents between 46.4 and 50.4% and N contents between 4.46 and 5.08%. Ten tables of analyses are given. C. A. 38, 5423 (1944).

(447) Strauss, R., "Progress in Producing and Processing Vegetable Fats (1930-1935)." Fett-Chem. Unschau 42, 219-28 (1935). - Fifty-two German

patents issued on extraction of oils during the five years previous to the year 1936 are reviewed.

O. & S. 14, 60 (1937).

(448) Suida, H. and Wagner, G., "Laboratory Extraction Apparatus for Solvents of Low Specific Gravity." Oel u. Kohle 39, 615-17 (1943). - The apparatus consists of a boiling flask for the solvent, a condenser extraction flask, and syphon connection with the boiling flask, and is designed to avoid condensation of the solvent vapors in the extraction flask, which would result in dilution of the liquid and lack of control of the extraction temperature. A metal apparatus of the same basic design is shown which can be used for work with liquid C_3H_8.

C. A. 38, 2853 (1944).

(449) Sweeney, O. R., Arnold, L. K., and Arnold, J. H., "Processing the Soybean." Iowa State College Official Publ. 28, No. 7, 3-46 (1929). - This bulletin presents information with regard to producing soybean oil by the hydraulic press method, the Anderson expeller method, and the solvent extraction system. Under latter are discussed the stationary extractor, the large-scale Soxhlet extractor, the rotary extractor, and extraction solvents. Plant design and production costs by all methods are given.

C. A. 24, 1238 (1930).

(450) Swisher, M. C. and Fiero, G. W., "The Solvent Extraction of Castor-Oil Seeds." J. Am. Pharm. Assoc. 21, 579-82 (1932). - The present method of preparation of castor oil consists in pressing the seeds and extracting the cake. Seeds that contain 45% of oil yield 30-40% of No. 1 oil by this method. Extraction of the press-cake yields 9.5-15% more of No. 3 oil. Various solvents have been suggested. Swisher and Fiero found that petroleum benzine gave a yield of 6.5% (14% efficiency), C_6H_6 13.3% (28% efficiency), Et_2O 15.4% (34% efficiency), $(CH_3)_2CO$ 22.8% (50% efficiency), toluene 23.0% (51% efficiency), and EtOH 42% (93% efficiency). A mixture of EtOH and MeOH removed a maximum of oil with a minimum of gums and ricin, and was sufficiently cheap and volatile for practical purposes. The oils obtained had some color, a bad odor, and an acrid taste. These were removed by passing steam through, followed by treatment with clay and charcoal. The characteristic odor and taste of castor oil were removed by the treatment. Compared with U. S. P. oil, the acid number was lowered somewhat and the I number raised.

O. & S. 9, 263 (1932).

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(451) Tayeau, F., "Separation of Two Principal Protein Fractions of the Peanut." Compt. Rend., Soc. Biol. 135, 591-94 (1941). - Two proteins have been separated from the peanut: arachin is insoluble in water in the absence of salts, while conarachin is soluble in pure water.
C. A. 36, 3825 (1942).

(452) Tayeau, F., "The Isoelectric Points of the Two Principal Protein Fractions of the Peanut." Compt. Rend., Soc. Biol. 135, 595-96 (1941). - The isoelectric point of arachin is 5.1-5.2 and that of conarachin is 3.9-4.0.
C. A. 36, 3825 (1942).

(453) Tayeau, F. and Macheboeuf, M., "Proteins of the Peanut, Arachis Hypogaea. III. Fractionation of the Proteins." Bull. Soc. Chim. Biol. 24, 273-77 (1942).

(454) Tayeau, F., "Proteins of the Peanut, Arachis Hypogaea. IV. Determination of the Isoelectric Points of Arachin and Conarachin." Bull. Soc. Chim. Biol. 24, 277-80 (1942).

(455) Taylor, Robert L., "How Soybeans Help Build Fords." Chem. and Met. Eng. 43, 173-76 (1936). - The solvent extraction plant for soybeans, operated by the Ford Motor Co., consists of a flaker, continuous extractor, filter, and solvent recovery system. Hexane is the solvent used. Both soybean oil and the meal are being used in the manufacture of enamel, gear shift knobs, window frames, and many other parts of the automobile.
M. B.

(456) Thieme, A., "Vegetable Oils by Extraction." Z. Ver. Deut. Ing. 77, 45-7 (1933). - Illustrated. Solvents used are: extraction benzine, C_6H_6, CS_2, CCl_4, and $C_2H_3Cl_3$. Apparatus consists of: diffusion batteries, Böhm's continuous extraction apparatus, and the Hansa-Mühle, Hamburg, continuous extractor. The latter is a bucket-elevator and spray arrangement within a closed tank and is used for soybeans with a benzene-alcohol (4:1) solvent; the dried extracted meal is used as animal feed.
O. & S. 10, 117 (1933).

(457) Thomson, R. H. K. and Traill, D., "Reaction of Ground-Nut Protein, Caustic Soda, and Water-Physicochemical Studies." J. Soc. Chem. Ind. 64, 229-31 (1945). - The viscosity and flow properties of NaOH solutions of ground-nut protein (17% N) were studied by latin square designs. Squares were examined after reaction for 10, 20, 30, 40, 50, and 60 hours at 20° and after 20 hours' reaction at 20°, 35°, 50°, 60°, and 70°. Rheological conditions, usually whether a soluble or a gel, are recorded; they are in accord with the Astbury hypothesis of the unfolding of globulin molecules.
C. A. 40, 3040 (1946).

(458) Thormann, K., "Solvent Extraction of Liquids." Chem. App. 26, 201-08 (1939). - A review of the general theory and applications.
C. A. 33, 7151 (1939).

(459) Torwald, Waldemar, "Criteria for the Choice of an Extraction System, Together with Descriptions of Up-right and Rotating Extraction Apparatus, with Special Emphasis on Efficiency." Chem.-Ztg. 48, 853-55, 874-76 (1924). - There are 2 classes of extractors: (a) raw material immobile and extraction medium mobile; (b) both raw material and extraction medium mobile. Battery extractors are usually the cheapest to operate. Centrifugal extractors take much power and are a complicated apparatus. In general, the efficiency of a horizontal extraction apparatus is only half that of an up-right one, and the upkeep, particularly in the rotating types, is higher. The horizontal rotating type is most valuable for slimy or finely divided substances. C_6H_6 is a dangerous solvent, and many explosions are due to it.
C. A. 19, 751 (1925).

(460) Traill, D., "Vegetable Proteins and Synthetic Fibers." Chemistry & Industry, 58-63 (Feb., 1945); Soc. Dyers and Colourists J. 61, 150-55 (June, 1945). - Whole peanuts contain approximately 28% protein and 48-54% oil. Peanut meal, from which the oil has been extracted at 40° C. or less, is dissolved in 0.1-0.2% NaOH and precipitated with acid of SO_2 until pH 5 is reached. The casein is dissolved in dilute alkali to form a 20-30% solution having an initial pH of 12.5. After ripening to a spinnable viscosity, the solution is extruded into a bath containing about 15% sodium sulfate and 1% H_2SO_4 at 25-40° C., and the fibers are drawn to produce some orientation. Hardening processes include treatments with HCHO and SO_2, reactive Cl compounds, anhydrides, ketenes, and aqueous solutions of halides, HCl, and HCHO. The tensile strength of the fiber is 10 kg. per sq. mm. and the ultimate elongation is 50-100%. At a constant rate of loading, the Hooke's law region extends to about 5% elongation. Birefringence is extremely low; this indicated a small degree of malorientation. Dimensional stability of the fiber is high because it is hardened without tension. The heat of wetting is 19 calories per g. at 0% moisture and 8 calories per g. at 10% moisture. Thermal insulation values of 100% Ardil fabrics correspond with values for 100% wool fabrics of the same thickness and structure. One hundred % Ardil fabrics have little resistance to abrasion, but the addition of Ardil to other fibers does not reduce the abrasion resistance of the fabric as much as might be expected. The spinning, weaving, and dyeing properties of Ardil compare favorable with those of wool. Ardil is mothproofed and its felting properties are due only to its thermoplasticity.
C. A. 39, 3434 (1945).

(461) Traill, D., "Ardil--A Protein Synthetic Fiber from Peanuts." Indus. Chemist 21, 71-4, 95 (1945); Textile Mfr. 71, No. 842, 71-3 (1945); Dyestuffs 38, No. 2, 39-44 (1946). - Oil is removed from peanuts by solvent extraction since heat above 40-50° C. (necessary in normal oil-expelling methods) renders the protein unfit for fiber production. In view of past experiments, two major problems had to be solved: (1) to find a more economical solvent for the protein and one which would give satisfactory spinning solutions and (2) to devise a method of rendering the protein fibers resistant to the washing, dyeing, and general finishing treatment which textiles encounter. A dilute alkali was employed as solvent in preparing a spinnable solution, and an aqueous solution of a highly soluble halide of an alkali was used as a hardening agent. The following characteristics of Ardil were discussed: color, tensil strength, absorptive capacity, felting, wear resistance, and dyeing properties.
M. B.

(462) Traill, D., "'Ardil'--A Synthetic 'Wool'. Monkey Nuts to Supply Clothing." Scot. Farmer 53, 607 (May 12, 1945).

(463) Traill, D. and McLean, A., "Extraction of Ground-Nut Proteins." J. Soc. Chem. Ind. 64, 221-24 (1945). - Defatted ground-nuts in the form of commercial oil-cakes and solvent extracted meal (7.91% N, 9.94% oil, and 6.42% H_2O) were treated with 0.15% NaOH for 1 hr. at 20°. More than 90% of the N present is extractable; of this, 55-85% is precipitable. The protein yield falls with the severity of heating previous to extraction; especially above 100°. Protein yield has no relation to N content of whole nuts, but is proportional to the N content of oil-free meal.

C. A. 40, 3207 (1946).

(464) Traill, D., "Textiles from Groundnuts; Production, Properties, and Use of 'Ardil'." Times Trade and Engin. (N. S.) 58, No. 986, 6 (1946).

(465) Tray, S. E. and Bilbe, C. W., "Solvent Extraction of Vegetable Oils." Chemical Engineering 54, No. 5, 139-41, 153, 160-63 (1947). - The process is described and a flowsheet given. Proportionate costs of basic items are presented. Plant layout, solvents, building, fire, piping, and automatic control are discussed; example of recently completed 200-ton-per-day cottonseed extraction plant cited.

C. A. 41, 4661 (1947).

(466) Truax, H. and Robinson, J. L., "Soybeans 'Go to the Cleaners' in New Solvent Mill." News for Farmer Coops. 11, No. 8, 18 (1944).

(467) Tsao, Utah, "Graphical Methods as Applied to Continuous Countercurrent Extraction of Solids by Liquids." J. Chem. Eng. China 4, 164-68 (1937).

(468) Tschernuchin, A., Gilman, D., Sumenko, R., and Ptschelinceva, V., "Extraction of Oil Cake With Dichloroethane." Maslob. Zhir. Delo, No. 3, 9-11 (1940). - Extraction with $C_2H_4Cl_2$ instead of petrol does not affect the yield or quality of the oil.

Br. A. BII, 52 (1941)

(469) Turner, F. M., "Modern Methods of Extraction by Means of Solvents." Oil & Fat Ind. 4, 5-10 (1927). - Discussion of the operation of a modern plant.

C. A. 21, 1196 (1927).

(470) Ubeda, Francisco Buscar'ons and Vinad'e, Jose Virgili, "Systematic Investigation of Technical Solvents." Ion 4, 795-802 (1944); 5, 81-90 (1945). - Trade names, boiling ranges, d., data, and analytical procedures for solvents and plasticizers, especially those used by Spanish industries.

C. A. 39, 3093 (1945).

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(471) Varteressian, K. A., "Solvent Extraction." Phys. Rev. 62, 42 (1943).

(472) Venezia, M., "Oil Content and Complete De-oiling of Grape Seed." Ricerca Sci. 11, 260 (1940); Chimie et Industrie 44, 425 (1940). - Analyses carried out on a large number of varieties of Italian grapes gave an average oil content of 14.38% on the dry basis for black-grape seed. The oil content of white-grape seed is slightly lower. Complete removal of the oil requires extraction with a suitable solvent (Et_2O or "trieline") of the ground seed; pressing gives decidedly lower yields.
C. A. 37, 2602 (1943).

(473) Viehoever, A., "Continuous Extraction Apparatus." Am. J. Pharm. 97, 42-44 (1925). - Lloyd's combined extraction and distillation apparatus is described. It shows the latest development of a series of apparatus constructed for plant extraction on a small and a large scale. The operation of the apparatus is given in detail.
C. A. 19, 911 (1925).

(474) Vix, H. L. E., Pollard, E. F., Spadaro, J. J., and Gastrock, E. A., "Solvent Extraction of Cottonseed and Peanut Oil. II. Effect of Heat on Cottonseed-Oil Miscellas." Ind. Eng. Chem. 38, 635-42 (1946). - The relation of heat on cottonseed-oil miscella in regard to objectionable color fixation in solvent extraction processes was studied. Color fixation became objectionable from prime oil under the following conditions: miscella heating time, refining oil temperatures, and bleaching oil temperatures, were respectively 15 minutes, 180-210° F., 150-180° F.; 1 hour, 150-180° F.; and 3 hours 150-180° F.; under 150° F. there was no appreciable difference in the refining losses. Absorption-spectrum studies suggested the possibility of approximating the amount of color. In bleaching and refining tests all the refined oils gave a firm layer of soap stock, although in most cases over this layer was a suspension of flocculent foots ranging up to 5% of the total weight of the soap stock. The regular "break" method with the 90-minute period of cold stirring after addition of alkali tended to give better soap-stock formation and a clearer unfiltered oil, an oil that filtered rapidly, and a lighter-colored refined and bleached oil. Vacuum-drying and centrifuging methods of de-emulsification in the refining tests both gave better soap-stock formation and were more satisfactory than the salting-out procedure. Further advantages of vacuum drying were low moisture content which prevented appreciable increase in the free fat acid of the oil on aging, a shorter period of de-emulsification, and no loss of oil or phosphatides; yet the refining losses and colors obtained were comparable to those obtained by centrifuging or salting-out. The solvent extraction of one prime lot of cottonseed produced a refined and bleached oil equivalent in quality to high-grade pressed-out oil. The data obtained supplied necessary engineering information for designing, installing, and operating solvent-extraction processes for cottonseed oil.
C. A. 40, 4537 (1946).

(475) Vix, H. L. E., Spadara, J. J., Westbrook, R. D., Crovetto, A. J., Pollard, E. F., and Gastrock, E. A., "Pre-Pilot-Plant Mixed Solvent Flotation Process for Separating Pigment Glands from Cottonseed Meats." J. Am.

Oil Chemists' Soc. 24, 228-36 (1947). - This investigation was made to develop a semi-pilot-plant process for the continuous removal of pigment glands from cottonseed meats, and is based on a laboratory method which uses severe agitation followed by flotation in a liquid medium of organic solvents of definite densities intermediate between the densities of the seed parts being separated. Procedures and apparatus are described at length; the solvents used were a commercial hexane and perchloroethylene. It was concluded that undefatted cottonseed flakes are preferable over defatted flakes for fractionation work because of yields, time, and the fact that the extraction can be concurrently carried out while the glands are separated from the meal. Pigment glands undergo some change during storage tending toward darkening. From 60 to 70% of the oil content of the flakes can be recovered as a miscella while the glands are separated from the meal. The shelf-type vacuum drier is suitable for removing the solvent from the meal but a process for doing this on a large scale remains to be developed. Large-scale production of prime oil and light-colored meal is possible, provided: a quick disintegration of the cottonseed in the solvent mixture is effected; a rapid removal of the pigment glands from the meal is made; and a miscella is produced from which the oil can be recovered by normal oil- and solvent-recovery methods. Cottonseed oil prepared by the mixed-solvent flotation process yielded oils of prime color when refined by a slightly modified A. O. C. S. refining method. 13 references.

C. A. 41, 5736 (1947).

(476) Vizern, M., "Treatment of Peanuts." Marseille. Inst. Colon. B. des Matieres Grasses 30, 103-16 (1946). - Methods are described for the cleaning and shelling of the nuts before oil extraction; the deacidification and neutralization of the crude oil; decolorization; and deodorization. Some possible uses for the nut shells are mentioned.

C. A. 40, 6850 (1946).

(477) Volkov, E. N. and Dvinyaninova, I. L., "Denaturation of Soybean Proteins by Organic Solvents and Heat." J. Applied. Chem. (U. S. S. R.) 13, 267-73 (in German, 273-4) (1940). - Treatment of soybeans with gasoline and alcohol caused the denaturation of protein in 30 minutes. Treatment for 3.5 hours did not visibly affect the degree of denaturation. The denaturation action of the solvents is greatest for the solvent of highest dielectric constant. Heat increases the denaturing effect of alcohol, but has little effect on that of acetone. In all cases, the greatest degree of degree of denaturation is effected in the protein containing the most moisture. Therefore, to protect protein from denaturation, soybean material should be dry and the temperature not over 90°.

C. A. 34, 7943 (1940).

(478) Von Bergen, W., "Soybean Fiber and Its Identification." Rayon Textile Monthly 20, 633-4 (1939). - Soybean protein is convertible into fibrous form. A pilot plant is now producing about 7.5 tons per day of this protein. The staple fiber produced from the soybean protein in general appearance such as color, luster, and touch closely resembles lanital. Soybean staple fiber is in about the same place as the staple fibers produced from casein were when first introduced in 1935. The fiber is about 4 times weaker than wool in the dry state and approximately 8 times weaker in the wet state.

C. A. 34, 631 (1940).

(479) Von Bergen, W. and Krauss, W., "Textile-Fiber Atlas. IX. Protein and Synthetic Fibers." Rayon Textile Monthly 21, 691-4 (1940). - The proteins considered are: (a) casein (milk), (b) α (soybean), (c) zein (corn), (d) fibroin (silk), and synthetic fibers nylon and vinyon. Several photomicrographs are included.

C. A. 35, 320 (1941).

-W-

(480) Wackerow, H., "Basic Questions Involved in the Production of Vegetable Fats and Oils." Allgem. Oel- u. Fette-Ztg. 29, 205-7 (1932). - Wackerow discusses the possible effects of varying climatic conditions and physiological changes in the oil seeds on the oil produced. The following percentages give the results for extraction of soybeans with ether, petroleum ether, and benzine, respectively, for different periods of time. Two hours 17.74, 18.12, 18.74; 3 hours 17.76, 18.56, 19.27; 4 hours 17.76, 18.58, 19.88; 5 hours 17.77, 18.60, 20.39; 6 hours 17.77, 18.63, 20.87; 7 hours 17.78, 18.63, 21.18; 8 hours 17.78, 18.64, 21.24; 14 hours ___, 18.66, 22.87. The higher results when petroleum ether and benzine are used are due to phosphatides and nonfatty soluble substances, which interfere with refining operations and lower the quality of the oil.

O. & S. 10, 137 (1933).

(481) Waeser, B., "Progress in Heavy-Chemical-Plant Apparatus. VIII. Extraction, Solution, and Crystallization." Chem. Tech. 17, 52-4 (1944). - A review of 62 papers and patents between Sept. 1, 1939, and Dec. 31, 1941, with 53 references.

C. A. 40, 5605 (1946).

(482) Waller, M., "A New Synthetic Fiber (Ardil)." Textile J. Austral. 20, No. 1, 33-4 (1945).

(483) Wamble, A. C., "New Opportunities Through Research." Oil Mill Gazetteer, 10-13 (Nov., 1946).

(484) Ward, A. L., "New Opportunities and Need for Research." Cotton and Cotton Oil Press 47, No. 21, 5-7 (Oct. 19, 1946). - Cottonseed processing.

(485) Watts, B. M. and Morse, L., "Soybean Flour as an Emulsifying Agent in Preparation of Salad Dressings." Food Res. 5, 197-203 (1940). - Benzine extracted, undenatured, soybean flour, heated with water, was successfully used as an emulsifying agent in the preparation of salad dressings.

O. & S. 17, 134 (1940).

(486) Wayman, M. and Wright, G. F., "Small Continuous Liquid-Liquid Extractors." Ind. Eng. Chem., Anal. Ed. 17, 55-6 (1945). - Several types of all-glass continuous liquid-liquid extractors are shown and described. A very small volume of liquid, of the order of 5 ml., can be used. Solvents either lighter or heavier than H_2O can be used.

C. A. 39, 842 (1945).

(487) Wesson, A. J., "Solvent Extraction and Refining of Cottonseed." Oil & Soap 10, 151 (1933). - Solvent extraction of cottonseed meats can yield a satisfactory oil, and should be practicable commercially, when suitable plant has been developed. The extracted cake, mixed with fat and H_2O, can be used as a meat substitute.

Br. A. B, 876 (1933).

(488) Whiton, L. C., "Design and Operation of a Solvent Extractor Plant." J. Oil & Fat Ind. 3, 268-76 (1926). - The most practical extractor is one of 5-6000 lbs. capacity without any movable parts such as agitators or circulating pumps and which are not interconnected with any other unit. The points of importance in the operation of such a unit are as follows: the seeds should be crushed to 1/8 to 1/16 in. in size by means of a crusher consisting of a pair of rolls each one operating at a different speed. The crushed seed should be handled as little as possible. The extractor should have a hopper above it so that the former can be charged rapidly. The solvent should be introduced at the bottom of the extractor; and at the end of the extraction period solvent vapors replace the solvent so that when dry steam is blown through the material the residual gaseous solvent is eliminated.

C. A. 21, 1196 (1927).

(489) Wiegand, W., "Method for the Calculation of Extraction." Z. Ver. Deut. Ing. Verfahrenstech 1942, No. 4, 117-20. - A graphical method is presented which is based on the establishment of experimental leaching curves. Detailed calculations are shown for the leaching of tanning materials.

C. A. 38, 4155 (1944).

(490) Wilkoff, H. L., Kaplan, J. M., and Berman, A. L., "Occurrence of Some Previously Unreported Fat Acids in Peanut Oil." J. Biol. Chem. 153, 227-35 (1944). - Fraction of the Me esters of acids from peanut oil gives a graded series of fractions b_{15} 85-265°. In the fractions distilling below 100°, 2 acids previously unreported from peanut oil were found. Determination of the I numbers of the fractions showed unsaturation peaks. A plot of weight of distillate against fraction number derived from the relation in the series gave peaks at places appropriate for C_8, C_{12}, C_{14}, C_{18}, C_{20}, C_{22} acids. Caprylic and lauric acids were identified by determinations of mixed m. ps. Myristic, palmitic, stearic, arachidic, behenic, lignoceric, 9-10 oleic, and linoleic acids were identified in similar unequivocal fashion and their presence in peanut oil was confirmed.

C. A. 38, 3863 (1944).

(491) Woodroof, J. G. and Leahy, J. F., "Microscopical Studies of Peanuts with Reference to Processing." Ga. Agr. Expt. Sta. Bull. 205, 3-39 (1940). - Besides the microscopical study, methods of manufacture of peanut oil, meal, and butter are detailed. Higher yields of better-quality oil were obtained by heating the nuts to 280° F. in a pressure cooker previous to pressing. The optimum moisture content is about 5%.

C. A. 34, 7638 (1940).

(492) Woodroof, J. G., Cecil, S. R., and Thompson, H. H. The Effects of Moisture on Peanuts and Peanut Products. Georgia Agr. Expt. Sta. Bulletin No. 241, 1945. 20 pages. - Storage rooms for peanuts and peanut products should have a relative humidity of 60%. The moisture content of cured peanuts should be held at 5%; roasted peanuts, 1.5%; hard peanut candies, 2%; soft peanut candies, 5%; and peanut flour, 4% or lower. Products stored at 80% relative humidity became rancid sooner than at lower humidities; rancidity, once initiated, progressed faster in peanuts stored at 50% relative humidity than at higher humidities. The moisture contents of peanuts and peanut products as determined by different drying and storage conditions were determined and correlated with general keeping qualities.

C. A. 40, 1612 (1946).

(493) Woodroof, J. G., "Why Moisture in Peanuts Should Be Controlled." *Food Industries* *17*, 1302-4 (1945). - Deterioration of the appearance and texture of peanuts and peanut products due to absorption of moisture was more important to the quality than rancidity or insect infestation. Freshly harvested peanuts can be dehydrated at 130° F. in 6 hours in air circulating at 400 ft. per minute. A relative humidity of about 60% was most satisfactory for the storage of peanuts and peanut products. The following moisture contents for a satisfactory storage life are recommended: cured peanuts 5, roasted peanuts 1.5, hard peanut candy 2, soft peanut candy 5, peanut flour 4% or less. Salted peanuts roasted in fresh oil were less subject to high moisture deterioration than those roasted in much-used oil.
C. A. *40*, 1246 (1946).

(494) Wormell, R. L. and Kaye, M. A. G., "Reactions Between Proteins and Formaldehyde." *J. Soc. Chem. Ind.* *64*, 75-80 (1945). - Acid casein (I) (14.9% N and 1.6% amide content) is prepared by self-souring of milk. When I is deamided by treating it with 1% NaOH for 40 hours at 45° C., deamido casein (II) (amide content 0.17% NH_3) is obtained. Partially deaminated I (III) (amide content 1.7% NH_3) is prepared by treating I with $NaNO_2$ in AcOH. II and III are compared with I as regards combination with HCHO in the presence of Na_2SO_4 or $CaCl_2$ and HCl. Caseins hardened in aqueous HCHO at pH 4 and then treated with $CaCl_2$ + HCl and HCHO are compared with regard to their HCHO content. Experiments were also carried out with groundnut casein, soybean casein, zein, their deamided derivatives, and with edestin. The results, given in several tables and curves, lead to the conclusion that under acid-salt conditions HCHO combines with the amide groups in the proteins. The results further indicate that under neutral conditions I and II react with HCHO in 2 stages. In the first stage, 2.6% HCHO is combined very rapidly; in the second stage, the increase in HCHO is very slow. On the basis of 6.3% lysine residues in I (*cf.* Blum, *Z. Physiol. Chem.* *22*, 127 (1896)) about 2 molecules HCHO are rapidly attached to each lysine side chain. In the second stage, cyclic methylene complexes may be formed at points where 2 NH_2 groups are linked together: $---NH_2 + CH_2O + H_2N--- \rightarrow ---NH\cdot CH_2\cdot NH---$(IV); IV + 2HCHO $\rightarrow$ $---N\cdot CH_2\cdot O\cdot CH_2\cdot N\cdot CH_2$. The theoretical implications of these conclusions are discussed.
C. A. *39*, 3557 (1945).

(495) Wrenshall, C. L., *A Survey of the Research Status of the Peanut Industry*. Birmingham: Southern Research Institute, 1946. 69 pages.

(496) Wrenshall, C. L., "Industrial Uses for Peanuts and Peanut Products." *The Chemurgic Digest* *5*, 157, 160-65 (May 15, 1946).

(497) Wrenshall, C. L. *Peanuts--Their Industrial Use*. National Farm Chemurgic Council, Chemurgic Papers, 1947 Series No. 2, No. 548, 1947. 5 pages. - Peanut oil is one of the primary products in the industrial processing of the peanut, and the prospects for its use seem to be very good. If solvent extraction methods are employed, the protein found in the residue from oil removal is of good quality and has important possibilities as an industrial material. New developments in the peanut field are the production in England of a peanut protein textile fiber called Ardil, development of Noreseal, a cork substitute which utilizes peanut hulls, and utilization of the red skins and hearts of peanuts. Development of peanuts as a chemurgic crop is being held back because peanuts cannot be produced economically in competition with other oil seeds. Larger yields per acre and

more effective methods for cultivation and harvesting must be brought about. Research on production problems is the key to the industrial future of peanuts.

M. B.

(498) Wulfinghoff, M. F. A., "Processing Equipment." Southern Power and Ind. 62, No. 2, 107-12 (1944). - Various processing methods are briefly discussed and a table is given which shows principle, procedure, advantages and disadvantages, equipment, applications and limitations for evaporation, desorption, adsorption, crystallization, and sublimation.

C. A. 38, 1149 (1944).

(499) Wulfinghoff, M. F. A., "Processing Equipment, II." Southern Power and Ind. 62, No. 4, 100-04 (1944). - Mechanical details and diagrams are given for evaporators, distilling equipment, absorption columns, scrubbers, saturators, extraction apparatus, adsorption apparatus, crystallizing and subliming apparatus, as well as hook-ups for evaporators, and distilling columns.

C. A. 38, 2240 (1944).

-Y-

(500) Yanovsky, E., "Extraction of Hemicelluloses from Plant Materials." Ind. Eng. Chem. 31, 95-100 (1939). - Hemicelluloses, from sugar-beet pulp, rice hulls, and peanut shells were extracted by means of HCl, H_2SO_4, and NaOH of various concentrations at 50°, 80°, and 100°. With rice hulls and peanut shells normal extraction curves were obtained. The curves of sugar-beet pulp, however, showed with alkali and acids peculiar breaks which might be caused by the presence of pectin. The amount removed by the extractions was determined by the difference in weight before and after hydrolysis. The filtrates were not further investigated. In the residues the pentosans were determined and computed to the original weight of the sample and in this way the amount of pentosans extracted was calculated.

C. A. 33, 1492 (1939).

(501) Yushkevich, S., Brilling S., and Antonenkov, F., "The Extraction of Oil from Soybeans." Masloboino Zhirovoe Delo, No. 4-5, 52-3 (1932). - The yield, color, odor, and taste of the oil were determined after extraction with C_2HCl_3, $C_2H_2Cl_2$, $CHCl_3$, C_6H_6, CCl_4, benzine (b. 65-90° C. and 85-105° C.), Et_2O, and Me_2CO. C_2HCl_3 and $C_2H_2Cl_2$, while giving excellent yields, impart an objectionable odor and taste to the oil.

C. A. 27, 2593 (1933).

(502) Yushkevich, S. F., Brilling, S. A., and Antonenkov, F. V., "Relations of Yield and Quality of Soybean Oil to the Kind of Solvent Under Various Conditions." Schriften Zentral. Biochem. Forschungs Inst. Nahr. Genussmittelind. 2, 380-99 (1933). - Choice of solvent has little effect on the physical and chemical constants of the extracted oil, but has a great effect on the yield and biochemical behavior. The chlorinated aliphatic hydrocarbon derivatives are the most effective. In a short extraction moisture in the soybean meal lowers the yield, but not in a long extraction. Fineness of the meal is important for good yield. For extracting technical grades of oil C_2HCl_3 and $C_2H_4Cl_2$ are recommended; for edible grades, C_6H_6 or CCl_4 or gasoline is recommended.

C. A. 27, 5563 (1933).

Foreign Patents

Australian

(503) Austral. 113,886, March 30, 1940 (date open to inspection), A. Ferretti, Insolubilizing Protein Fibers During Their Manufacture. - Protein fibers of vegetable or animal origin (casein, soybeans) are insolubilized in the last step of the process. This is done in a vacuum boiler containing, e.g., $Al_2(SO_4)_3$ 40-50, $Cr_2(SO_4)_3$ 50-60, NaCl 180-200, and 100% CH_2O 35-40 g. per l. The temperature of this bath is 70° C., and the treatment lasts for 6-9 hrs. After the treatment the fibers are washed thoroughly and any traces of acid neutralized in a suitable alkaline bath.
C. A. 36, 3683 (1942).

British

(504) Brit. 16,148, July 10, 1909, S. Wijnberg, Extraction and Purification of Waxes, Fats, and Oils. - In the extraction and purification of waxes, fats, and oils, the solution, as soon as it is obtained from the raw material, is filtered in the same vessel over bleaching substances contained therein.
C. A. 5, 222 (1911).

(505) Brit. 25,669, Nov. 4, 1910, S. Wijnberg, Fats, Oils, and Waxes Extracted. - Fats, oils, and waxes are extracted by means of solvents in a vessel, and the resulting solution is filtered in a vessel and is afterwards distilled in a still, the solvent being condensed in a coil and returned by a pipe to the extractor for a further treatment of the raw material. Trichloroethylene, ether, benzene, etc., may be used as solvents.
C. A. 6, 1548 (1912).

(506) Brit. 109,265, Aug. 27, 1917, H. Bollmann, Extraction of Oil and Bitter Substances From Food Preparations. - Oil and bitter substances are removed from foodstuffs, such as oil-containing seeds, yeast, and fish, by treating the foodstuff with a mixture of alcohol and benzene, or alcohol and benzine, or alcohol and a Cl-substituted hydrocarbon, such as CCl_4.
C. A. 12, 73 (1918).

(507) Brit. 113,530, Apr. 2, 1917, C. Downs and R. A. Bellwood, Extracting Oil. - In apparatus for extracting oils from seeds, etc., by solvents, the solvent on its way to the extractor is passed through preheaters, in the first of which it is heated by means of solvent vapors generated in a still for oil-laden solvent, and in the second of which it is heated by means of steam in the usual manner. The solvent vapors from the first preheaters are led to the usual condenser, a trap being provided for the removal of solvent condensed therein. Unused solvent is led to this preheater through a valved pipe.
C. A. 12, 1424 (1918).

(508) Brit. 120,156, Jan. 24, 1918, A. M. Winters, Extracting Oils. - Oil-bearing material such as offal or crushed seeds, beans, nuts, etc., passes

from a hopper through one or more extracting chambers provided with conveying worms wherein it is treated with solvents, such as benzine, supplied through the perforated shafts of the worms or through perforation in the upper parts of the chambers covered by a jacket. The solvent is supplied to the first two of the chambers but not to the third. The solvent passes from the chamber through removable sieves and by pipes into a chamber containing inclined baffles and sieves and heated by steam from a pipe. The solvent vapors are led to a condenser and the condensed solvent is returned to the extraction chambers, H_2O being separated in a gravity separator. The oil is removed by a pipe. The material, after passing through the extraction chambers, falls down a chute into a chamber heated by steam from a pipe and containing inclined grids or sieves. The solvent is removed as vapor and is returned to the extraction chambers by way of condensers and water-separator. Air, laden with solvent vapors from various parts of the apparatus, is passed through a washer to separate the solvent.

C. A. 13, 520 (1919).

(509) Brit. 122,477, Jan. 24, 1918, W. Anderson, Extracting by Solvents. - In apparatus for extracting materials by volatile solvents, such as oil from cotton waste or earthy substances or cyanides from spent oxides, in which the extraction is performed in a centrifugal machine into which the solvent is introduced as vapor mixed with steam, the steam used is exhaust steam from a turbine which drives the centrifugal machine, and the solvent may be mixed with this steam as it enters or issues from the turbine. The vapor which leaves the centrifugal machine passes by a pipe, to a condenser. The condensate passes to a gravity separating device whence the solvent is returned to the centrifugal machine. The solvent containing the extracted material passes to an evaporator connected to the condenser.

C. A. 13, 1751 (1919).

(510) Brit. 123,645, Apr. 18, 1919, L. J. Simon and J. W. Hinckley (to Fisher Chem. Eng. Co.), Extracting Oils, etc., by Volatile Solvents. - An apparatus for extracting oils, fats, grease, wax rubber, or other substance from materials containing them, by means of volatile solvents, consists of a casing containing a chamber in which the extraction takes place and a chamber in which the solvent is distilled off the extraction, and so arranged that the solvent can be passed either upward or downward through the material to be treated without being withdrawn through it, and that the two chambers can be separated by a light seal when desired.

C. A. 13, 1649 (1919).

(511) Brit. 143,196, Mar. 1, 1920, L. Whiton and V. Bredlik, Improvements in Extraction of Fatty Material From Garbage and Other Fat-Containing Material. - Prior to the extraction of fatty matter from garbage, slaughter-house refuse, etc., by means of volatile solvent, the material is subjected to sudden variations of pressure to break the cells. Solvent is now admitted, and the pressure is raised and maintained until extraction has taken place and again suddenly released. The temperature is never allowed to rise above 50° C. A suitable construction is specified.

C. A. 14, 2867 (1920).

(512) Brit. 156,905, Jan. 14, 1921, Improvements in or Relating to the Extraction of Fat or Oil from Raw Materials.

(513) Brit. 157,155, Jan. 8, 1921, P. L. Fauth, Extracting Oils. - In the extraction of oil from seeds, etc., by benzine, the mass is pressed after each saturation with the solvent.

C. A. 15, 2007 (1921).

(514) Brit. 183,825, July 21, 1922, S. Zipser, Extracting Fats. - In the extraction of fats by volatile solvents the extract is forced out of the extractor by solvent vapors, preferably those from the still in which the extract is distilled, aided or not by a suction pump. The extract may be preheated before admission to the still by waste vapors from the still and extractors, the residual solvent may be removed by steam or by solvent vapors, and preferably all operations are carried out without admitting air to the apparatus. A suitable apparatus is specified.

C. A. 17, 221 (1923).

(515) Brit. 184,621, June 3, 1921, W. J. Jellersh-Jackson, Extracting Fatty Oils. - "Cakes" are formed by compacting charges of the cotton seed copra, or other meal in a die between perforated and grooved metal plates with attached fabric. The cakes, with the plates attached, are then packed in the oil-extracting press.

C. A. 17, 221 (1923).

(516) Brit. 186,040, July 27, 1922, S. Zipser, Extracting Fats, etc.; Distilling Fatty Acids, etc. - In the extraction of fats, etc., by volatile solvents, air is excluded and the varying pressure due to the movement of fluids in the plant is corrected by the flow of H_2O in or out of a tank connected to the separator of the condensed steam and solvent. H_2O may also be run from the tank to reduce the pressure throughout the plant, and any gas, such as air admitted during charging of the extractors, containing vapors not liquefied by the condenser, is returned to a freshly charged and preferably evacuated extractor for adsorption of the vapors by the charge. A suitable apparatus is specified.

C. A. 17, 1160 (1923).

(517) Brit. 197,429, Feb. 17, 1922, H. Bolimann, Extracting and Purifying Oils, etc. - In a countercurrent process for the extraction by solvents of the oils from dust-like substances contained in oil sediments or residues from filter process, or for purifying fats and oils by bleaching earths, the earth or residue from a reservoir and the oil or solvent from another reservoir are alternately conveyed in opposite directions through superimposed compartments of an extraction tower provided with settling vessels having non-return flap values and with partitions having non-return valves A suitable construction is specified.

C. A. 17, 3800 (1923).

(518) Brit. 207,542, Nov. 22, 1923, Soc. Anon. Acetoleum., Extracting Oils - Oil is extracted from oil-cakes or other oleaginous materials by acetone or other solvent soluble in H_2O. The extract is freed from acetone by washing with H_2O and then with a solution of $NaHSO_3$. Residual solvent is removed from the grains either by washing with H_2O or by heating to 60-70° C.

C. A. 18, 1582 (1924).

(519) Brit. 214,478, May 28, 1923, P. L. Fauth, Continuous Process for Recovering Oils from Oil-Seeds. - The pressing of the crushed oil-seeds,

solvent extraction of the resulting cake, and subsequent refining of the oil are carried out as a continuous series of operations in such a way that any cooling and consequent necessary reheating of the material and solutions under treatment are avoided as far as possible. The crushed seed is pressed in an automatic press, whereby 60-70% of the total oil is removed. The ground press-cake is conveyed by means of screw conveyors through inclined steam-jacketed drums, in which it is extracted with trichloroethylene; it is subjected to intermediate pressings between the extractions by passing it through roller presses. The combined expressed and extracted oil is mixed to form an oil solution of a definite concentration, which is treated with the necessary quantity of sodium hydroxide solution in tanks exhausted of air and provided with stirring gear. The lye, being specifically lighter than the oil solution, is introduced near the bottom of the tanks through coiled pipes perforated with small openings. The precipitated soap is separated from the oil solution by running in a saturated solution of common salt through the same perforated pipes. The salt solution is of such specific gravity that the soap floats upon it whilst the oil solution lies below it. By this means the loss of neutral oil in the precipitated soap is largely avoided. The salt solution produces a washing effect during the subsequent boiling and drying of the soap. In addition to the saving of fuel effected by eliminating cooling and reheating of oil and solvent, a great saving of time is effected, the whole of the working operations being condensed into about one-tenth of the time hitherto required.

J. S. C. I. B, 526 (1924).

(520) Brit. 215,113, E. C. R. Marks, Apparatus for Conditioning Maize or Other Grain or for Extracting Oils, Fats, and Waxes. - In a continuously operating counter current apparatus, an extractor or washer is connected with a continuous rotary steamer for recovering solvent or further conditioning grain.

C. A. 18, 2927 (1924).

(521) Brit. 216,834, June 1, 1923, P. C. Lemale, Apparatus for Extractions with a Recovery of Volatile Solvents. - The apparatus is adapted for extraction of oils, fats, or grease from seeds, hides, skins, or clothes and distilling the solvent or for recovery of light hydrocarbons and removal of H_2O from petroleum. Extraction and distillation vessels are exhausted by the action of a liquid-jet exhauster of the centrifugal type replaced by N or CO_2.

C. A. 19, 26 (1925).

(522) Brit. 243,030, Nov. 17, 1924, A. Eichengrün, Methylene Chloride as a Solvent for Various Organic Substances. - CH_2Cl_2 either alone or with other solvents or with non-solvents is used as a solvent of fats, oils, mineral oils, rubber, resins, bituminous substances, alkaloids, cellulose esters, and other organic substances, for extraction, cleaning, or other purposes.

C. A. 20, 3757 (1926).

(523) Brit. 244,557, Oct. 25, 1924, A. Sizer, Extracting Oils by Pressure and Solvent Treatment. - An apparatus is described adapted for obtaining oil from materials such as palm kernels, linseed, cottonseed, rapeseed, sunflower seed, olives, copra, and ground-nuts.

C. A. 21, 335 (1927).

(524) Brit. 255,923, June 17, 1925, L. J. Simon, A. Simon, and Simon Bros. (Engineers), Ltd. Extraction of Oils, Fats, Waxes, Greases, and the Like. -

Improved results are achieved in a machine which treats small quantities of meal at a time, leading to a high rate of solution of fatty oil and thorough removal of solvent from meal. Solvent is conveyed by large entry pipes on to a few inches depth of meal contained in a rotating cage, whereby continuous agitation with solvent occurs, and the amount of liquor left in the meal on drainage is a minimum. Apparatus is described.

Br. A. B, 49 (1927).

(525) Brit. 256,019, June 25, 1925, J. MacGregor, E. Scott, and Co., Ltd., Apparatus for Extraction of Oils, Fats, Waxes, Resins, and Greases from Substances Containing Them. - The material is treated with solvent in one or more percolators or extractors mounted above a steam-heated solvent recovery vessel with which the percolators are in communication by means of passages controlled by valves. When extraction has been carried to the desired extent the supply of solvent is cut off from the extractors, the solvent and oil are drawn off, and the treated material is caused to fall into the solvent recovery vessel, where it is subjected to the heat of the steam in the surrounding jacket or, where desired, subjected to open steam. The recovery vessel is vacuum-operated and when removal of solvent is completed, the treated contents are discharged. When continuous operation is desired, the extracted material from the extractors, instead of going to the recovery vessel direct, is passed into a hopper, whence, by means of a worm-feed device consisting of externally heated tubes, the discharged material is ultimately delivered into a vacuum vessel, and then it passes through a discharge orifice controlled by a valve into a second vessel. From this lowermost vessel the material can be discharged without breaking the vacuum in the remainder of the apparatus.

Br. A. B, 923 (1926).

(526) Brit. 265,212, Feb. 9, 1928, J. Behrens, (to I. G. Farbenindustrie, A.-G.), Process of Extracting Castor Oil.

(527) Brit. 270,869, March 30, 1926, G. W. Bradshaw, Apparatus for Extracting Fats or Oils from Linseed, Fish Meat, Fish Guano, Vegetable Materials, with a Solvent.

(528) Brit. 272,118, Jan 14, 1927. F. Krupp Grüsonwerk A.-G., Tube and Worm Apparatus for Extracting Oil from Various Material by Use of a Solvent and Pressure. - The solvent and material undergoing extraction pass from one extraction tube to another countercurrent-wise, but in each individual tube they pass in the same direction.

C. A. 22, 1502 (1928).

(529) Brit. 278,145, Aug. 23, 1926, C. Downs and R. A. Bellwood, Extracting Oils from Seeds, etc. - A thin layer of the crushed material is passed along within an enclosed chamber and repeatedly sprayed with solvent and subjected to suction to effect withdrawal of the solvent. An apparatus is described.

C. A. 22, 2678 (1928).

(530) Brit. 278,815, July 19, 1926, L. J. Simon and Simon Bros. (Engrs.), Ltd., Apparatus for Distillation and Recovery of Solvents Used in Oil Extraction. - The apparatus is intended for use in conjunction with Brit.

255,923, where, instead of being intermittent, continuous distillation of solvents from a mixture of oils and solvents is desired. The method consists in treating the mixture in a preliminary distiller of the usual type which itself is made to control, by means of a ball float, the quantity of solvent to be evaporated by a number of smaller stills arranged in series, parallel or series-parallel, the whole to provide for a continuous distillation of the liquid under treatment. The small distiller vessels (stills) contain closed steam coils, and the end still may contain both closed and open steam coils. Each small still contains a tray having a heating coil along which the solution travels and is provided with baffles for circulating liquid around the tray, heating coils in the body of the still, and adjustable means for controlling the depth at which liquid is removed from each still. The vaporising of solvent from a solution gradually lowers the level of solution and permits the flow of fresh solution to the small stills at a rate which increases as the solution in the preliminary distiller tank becomes more concentrated.

Br. A. B, 946 (1927).

(531) Brit. 278,891, Oct. 22, 1926, J. Savage, Apparatus and System for Extracting Oils with Solvents. - Moist oleaginous materials are subjected to extraction by circulating through them the vapors of a volatile solvent; the extracted water and solvent are condensed and separated, and the solvent is returned to the extraction chamber at a temperature just below its b.p. at the pressure existing in the apparatus. Various details of the apparatus are described.

C. A. 22, 2851 (1928).

(532) Brit. 279,122, Oct. 17, 1927, E. A. André, Treatment of Oil Seeds and the Like. - Oil seeds having an oil content of 30% or more and aleurone grains (e. g., linseed, sunflower, etc.) are crushed and the oil is extracted by a neutral hydrocarbon solvent in the absence of water; the methods of dressing (methodical bolting) employed in milling are applied to the oil-free meal to obtain graded nutritive products.

Br. A. B, 218 (1929).

(533) Brit. 280,986, July 21, 1926, C. Downs and R. A. Bellwood, Apparatus for Extraction of Palm Oil or Other Oils with Solvents.

(534) Brit. 282,446, Dec. 17, 1926, E. Silvane and V. L. Cerri, Washing or Extracting Seed or Oil Cakes or Other Materials. - The material is treated in a thin layer on a conveyor belt or the like which acts as a filter for the treating liquid or extraction after it has passed through the layer. An apparatus is described.

C. A. 22, 3795 (1928).

(535) Brit. 286,752, Nov. 8, 1926, J. R. Sterling, Apparatus for Extracting Oil or Fat from Seeds, Offal, Fish, or other Vegetable Material by Use of Solvents.

(536) Brit. 288,670, Dec. 14, 1926, L. J. Simon and Simon Extracting Machine Synd., Ltd., Extraction of Oils and the Like from Bodies Containing the Same. - (Cf. Brit. 255,923). Oils, fats, and waxes are extracted by subjecting the material to repeated flushings with solvent while disposed

in a basket rotating in a closed extraction vessel from which the solution is withdrawn and re-introduced into the center during each flushing. This process provides a more expeditious method of manipulating the solvent and solutions from the various flushings.

Br. A. B, 455 (1928).

(537) Brit. 297,816, Sept. 30, 1927, F. Krupp Grüsonwerk A.-G., Apparatus for Extracting Oil from Seeds, etc., by Use of Solvent. - Horizontal extractors are used in an apparatus generally similar to that described in Brit. 272,118.

C. A. 23, 2843 (1929).

(538) Brit. 298,675, July 15, 1927, G. W. Bradshaw and E. R. Jackson, Apparatus for (Solvent) Extraction of Oils, Fats, etc., from Substances Containing the Same. - A valve mechanism to be placed between the solvent extractor and the vessel used for solvent recovery from the meal is described. The inlet to the latter vessel stands up above the floor of the valve casing and constitutes the seating of the valve, which consists of a horizontal sliding hollow casing, closed by a perforated plate through which the solution may be drained from the extractor.

Br. A. B, 103 (1929).

(539) Brit. 316,881, Aug. 4, 1928, C. Schlotterhose and H. Brandt, Apparatus for Extracting Oils from Seeds (or Effecting Similar Extractions) by Counter-Current Treatment with Solvents. - The dried material is carried by screw conveyors in a counter-current direction upwards through a battery of inclined extractor chambers; the upper part of each extractor is tapered and fitted so that the bulk of the solvent is pressed out of the material as it passes to the next extractor. Apparatus is provided for the continuous removal of solvent from the meal and extract.

Br. A. B, 71 (1931).

(540) Brit. 319,013 Sept. 14, 1928, I. G. Farbenind. A.-G., Extraction of Oils, Alkaloids, Salts, etc., from Solid Materials. - In the extraction of disintegrated soybeans with methylene chloride, or in other extractions, the material undergoing extraction is pressed first downwardly and then upwardly, through a U-shaped tube, counter-current to the solvent. Various details are described.

C. A. 24, 2516 (1930).

(541) Brit. 324,681 Aug. 1, 1928, Prosco Oils Corp., Apparatus and Counter-Current Solvent System for Extraction of Oils and Fats from Cacao-Cake Powder, Soybean Flakes, or Other Materials. - Various details of construction and extraction procedure are described.

C. A. 24, 3917 (1930).

(542) Brit. 336,273, June 10, 1929, M. Sato and C. Ito, Extraction of Oil, etc., from Soybeans. - Extraction with a solvent such as EtOH is effected at a temperature above the b. p. of the solvent but below 120° C. (suitably at about 85° C.), and the solution of fatty oil is drawn off and cooled to below 50° C. to separate oil and obtain a liquid residue containing coloring matter, sugar, and lecithin.

C. A. 25, 2016 (1931).

(543) Brit. 336,274, June 10, 1929, M. Sato and Y. Ishida, Extraction of Oil, etc., from Soybeans. - This patent describes the extraction of soybeans and the like with a solvent such as alcohol admixed with benzine or benzene of such concentration and quantity that the water in the resulting liquor is less than 10%. Extraction is effected above 65° C. and oil is separated by cooling. An arrangement of apparatus is described.

C. A. 25, 2016 (1931).

(544) Brit. 337,770, Aug. 1, 1929, F. E. Rogers, Extracting Oils and Grease with Solvents. - Various details of apparatus are described for use in a process such as described in Brit. 278,891. A condenser and the means for heating the apparatus are interconnected so that the cooling of the condenser ceases when the heat is shut off.

C. A. 25, 2318 (1931).

(545) Brit. 341,079, Oct. 29, 1929, K. Yoshida, Extracting Oils such as Soybean Oil by Pressure. - Raw material such as powdered soybeans is preliminarily heated with an oil (preferably an oil identical with that to be extracted or one suitable for admixture with it such as hardened fatty oil or suitable liquid animal, vegetable, or paraffin oils) to evaporate moisture and loosen the vegetable tissues, and the oil is subsequently separated, as by centrifuging.

C. A. 25, 4143 (1931).

(546) Brit. 341,581, July 27, 1929, I. G. Farbenind. A.-G., Extracting Oil-Bearing Seeds. - Material such as cacao press-cake is forced downwardly and then upwardly through a solvent passed countercurrentwise, and a plunger is so operated as to impart a vibratory movement to the material. Apparatus is described.

C. A. 25, 4143 (1931).

(547) Brit. 357,172, June 14, 1929, P. L. Fauth Ges., Apparatus (With Drums and Internal Helical Blade Devices) For Use in Extracting Oils from Seeds, etc., with Solvents. - Numerous structrual and mechanical details are described.

C. A. 26, 3130 (1932).

(548) Brit. 361,029, Sept. 8, 1930, L. M. Brown, (to A. A. Thornton), Extraction of Oil from Vegetable Materials. - Seeds (e. g., soybeans), press-cakes, etc., are treated below 100° with a dilute aqueous solution of a volatile alkali (NH_3), which extracts the bitter principles, mucilage, etc., then drained (and crushed), and extracted with a volatile fat-solvent.

Br. A. B, 152 (1932).

(549) Brit. 366,969, Nov. 6, 1930, A. F. Yuill and S. R. Bhate, Extracting Oil and Other By-Products from Ground-Nut Sludge. - The oily sludge (obtained in the filtration of expeller-expressed oil) is mixed with about 30% of 30% caustic lye at room temperature and after ½ hour is boiled with about 7 volumes of 5-10% NaCl solution. The oil which separates is skimmed off, the solid residue being suitable for fertilisers; acid treatment of the aqueous layer yields a precipitate of a useful casein-like material and a filtrate from which protein matter can be recovered.

Br. A. B, 435 (1932).

(550) Brit. 367,563, Feb. 19, 1931, Karl Hildebrandt, Apparatus for Extracting Oils and Fats By Counter-Current Treatment with Volatile Solvents. - The fatty material is dropped through one limb of a U-shaped container and conveyed by a worm through the horizontal member and up the other limb; the inlet pipes for the solvent (which flows in the counter direction) project into the interior of the container.

Br. A. B, 435 (1932).

(551) Brit. 400,613, Oct. 23, 1933, Shis Hitoshi, Apparatus for Extracting Fats, etc., from Materials, e. g., Wool, Cotton Fabrics, Fish, etc., with Volatile Solvents.

(552) Brit. 408,106, April 5, 1934, K. F. Wilhelm, Apparatus and Method for Bringing Oil Seeds into Fine and Coherent Lamellar Form, Suitable for Extraction by Solvents.

(553) Brit. 410,301, May 17, 1934, Soc. Anon. Etablissements A. Olier, Apparatus and Process for Extracting Solid Materials, e. g., Powdered Peanuts, Palm Nuts, Soybeans, Cottonseed, Copra.

(554) Brit. 413,041, July 12, 1934, A. R. Jahn, Extraction Method and Apparatus. - Fats, oils, waxes, and resins are extracted from raw materials containing them by treatment in an extractor with solvent vapors under pressure, suction is generated by a low pressure produced by condensation of the vapors and by an induced draft at the end of the apparatus being applied to the vapor exit of the extractor. C. A. 29, 630 (1935).

(555) Brit. 421,049, Dec. 10, 1934, H. E. J. Peake, Extracting Fatty Oils. - This patent describes a method of extracting dry oil or fat-containing material by treating with 15% oil solvent not miscible with water and 30% hot water based on oil bearing material, followed by removing the mixture of solvent and oil that rises to the surface.

O. & S. 13, 91 (1936).

(556) Brit. 422,530, Jan. 14, 1935, Karl Sohler, Continuous Apparatus for Extracting Oil from Seeds, etc. - In apparatus consisting of a series of extractors for treating seeds and other oil-containing materials in counter-current with a solvent, the first extractor consists of a chamber in which is mounted a perforated feed pipe through which the material passes into a second extractor.

C. A. 29, 4614 (1935).

(557) Brit. 457,552, Nov. 25, 1936, I. G. Farbenindustrie A.-G., Effecting Chemical Reactions and Extraction Processes. - Extraction processes and reactions between components of different phases are effected by subjecting the reaction vessel to rapid oscillations of circular or elliptical form with a frequency of some hundreds to some thousands per minute and an amplitude of, e. g., 5 mm. Apparatus is described. The invention is applicable to the extraction of bones with benzene or earthnuts with trichloroethylene and to reactions such as sulfonation, nitration, oxidation, reduction, halogenation, alkylation, arylation, mercerization, condensation, and to hydrogenation, particularly of carbon, e. g., lignite. Examples are

given of the application to the (1) nitration of pyrene (I), (2) bromination of I, (3) nitration of acenaphthene, (4) formation of a brown product by reaction between 3-aminopyrene, AcONa, and tetrachlorobenzoquinone in alcohol, (5) oxidation of 2, 1-naphthoxythionaphthene to 2, 1-naphthioindigo, (6) catalytic reduction with hydrogen of p-nitroaniline, and (7) hydrogenation under pressure of lignite.

C. A. 31, 3173 (1937).

(558) Brit. 459,763, Jan. 14, 1937, Gesellschaft zur Verwertung Fauthscher, An Improved Extraction Process for Vegetable Oils. - Inventors of Gesellschaft zur Verwertung Fauthscher, Patente m. b. H., improved the economy of their solvent extraction system by altering the apparatus so that the grinding and the roller mills are submerged in the solvent.

O. & S. 15, 91 (1938).

(559) Brit. 461,760, Feb. 24, 1937, P. Ammann, Preparing Foods from Earth-Nut Kernels, etc. - Alimentary substances are prepared from earth-nut kernels or other edible oleaginous grains or seeds by subjecting the decorticated and uncrushed kernels to intense desiccation by heating at about 50-90° to a H_2O content of 1-4%, subjecting to the action of presses for the extraction of the oil, disintegrating the cake thus obtained, removing the skins of the kernels by rubbing and winnowing, and milling or grinding the kernels to a flour. The kernels may be coarsely ground and treated with a solvent, e. g., rectified petroleum ether, to remove some of the remaining oil.

C. A. 31, 5894 (1937).

(560) Brit. 466,882, Oct. 31, 1935, Standard Brands, Inc., Treating Oil-Bearing Seeds, Beans, and the Like. - Oil seeds, especially soybeans, are treated with a fat solvent, e. g., EtOAc, the solvent containing the oil is removed by expression, and the meal dried and comminuted, all the operations being conducted at not more than 70° (at 30-40° for the beans) in order not to destroy the enzymes present in the flours. The solvent is removed from the oil solution by distillation as usual.

Br. A., 1083 (1937).

(561) Brit. 467,704, June 22, 1937, A. C. Chibnall and K. Bailey, (to Wm. T. Astbury), Artificial Filaments, Films, etc. - Threads, films, etc., are obtained by extruding a solution of a vegetable globular protein, e. g., edestin, ground-nut, soybean, or castor-bean globulin, that has been degenerated or denatured and dissolved in an aqueous solution of urea, thiourea, methylurea, other substituted urea or thiourea compound, Na thiocyanate, Na salicylate formamide, acetamide, or urethan or other lower alkyl ester of aminoformic acid. Protective colloids or dispersing agents may be present in the protein solutions. The solutions may be rendered more stable and the viscosity may be controlled by addition of a small proportion of glyoxal polymer (I), CH_2O, BzH, ethylene oxide, glycide salicylic acid, gelatin, acetophenone, triacetin, sorbitol (II), glycerol (III), polyglycols, glucose, triethanolamine, and, if not already present, thiourea. These additional substances may also be added to the coagulating bath or to a subsequent treatment bath. If desired, the protein may be denatured or degenerated before the process of solution but in such case the use of a protective colloid or dispersing agent may be necessary to effect solution. The diluent or regenerating medium into which the solutions are extruded may be H_2O, dilute aqueous solutions of $(NH_4)_2SO_4$, Na_2SO_4, or Na_2SO_3, or the other

liquid. Small quantities of H_2SO_4, AcOH, $ZnCl_2$, glycerol, or sorbitol are preferably added to the regenerating liquid. The products may be strengthened by immersion in solutions of CH_2O, dichromate, chrome alum, potash alum, $Al_2(SO_4)_3$, $AlCl_3$, tannin, or picric acid. The softness can be enhanced by treatment with solutions of waxes in oils or alcohol. Among examples, ground-nut seed globulin, urea, thiourea, and II are ground together and then mixed with solution of gelatin, I, and H_2O until dissolved, the solution is filtered, centrifuged, ripened, and extruded into a warm solution of $(NH_4)_2SO_4$, $ZnCl_2$, H_2SO_4, III, and H_2O, and the filaments obtained are treated with a solution of III and II in H_2O and then with a solution of CH_2O.

C. A. 31, 8924 (1937).

(561A) Brit. 467,812, June 22, 1937, A. C. Chibnall, K. Bailey, and W. T. Astbury, Artificial Filaments, Films, etc. - Filaments, etc., are obtained by extruding a solution of casein in aqueous urea solution through an orifice into a diluent or other regenerating medium.

C. A. 31, 8924 (1937).

(562) Brit. 477,050, Dec. 21, 1937, N. V. de Bataafsche Petroleum Maatschappij, Separating Liquid Mixtures by Solvent Extraction. - The least soluble component, A, of a liquid mixture containing at least 3 miscible components, A, B, C, that are progressively soluble in a solvent extracted by first submitting the mixture to simple extraction with a selective solvent for the most soluble component, C, and, then extracting the raffinate, A + B + some solvent, in a main extraction zone with a selective solvent for B under rectifying-extraction conditions as described in Brit. 355,294 (C. A. 26, 3100), 380,954 (C. A. 27, 2742), 417,617 (C. A. 29, 964), and 424,867 (C. A. 29, 4977). The selective solvent for B is preferably less selective than that used in the 1st stage, but the same solvent may be used in both stages if the temperature of extraction in the 1st stage is lower than in the 2nd. Mixtures that are treated are petroleum oils containing paraffins (A), naphthenes (B), and aromatic compounds and asphaltenes (C); fatty oils, mixtures of alcohols, or of alcohols with parent olefins; Cl compounds, or fatty acids; polymerized fatty oils, fatty acids, aldehydes, or hydrocarbons such as polymerized isobutylene; oxidation products of paraffin wax containing alcohols, acids, aldehydes, and acid anhydrides. Selective solvents for the 1st stage are liquid SO_2, aliphatic compounds containing 6 C atoms or less with 1 polar group or iso- or hetero-cyclic compounds with more than 1 polar group, e. g., -dichloroethyl ether, furfural, PhOH, formamide, crotonaldehyde, Me thiocyanate, propionitrile, acetonitrile, $PhNO_2$, $MeNO_2$, resorcinol, pyrogallol, nitrophenol, nitroaniline, dinitrochlorobenzene, nitrobenzaldehyde, 3,4-diaminoacenaphthene, acenaphthenequinone, and naphthalenedicarboxylic acid. Selective solvents for the 2nd stage are phenols, cresols, $PhNO_2$, benzyl alcohol, $PhNH_2$, acetophenone, toluidine, BzH, naphthylamine, naphthonitrile, fluorenone, aminopyridine, thiophene aldehyde, used alone or in admixture with a more selective solvent if the solvent power is too great. If the solvent power is too low, diluents, e. g., $CHCl_3$, C_6H_6, cyclohexane, $C_{10}H_8$, tetrahydronaphthalene, furane, liquid BuH, CS_2, pyridine, or quinoline are added. Apparatus is described.

C. A. 32, 4020 (1938).

(563) Brit. 478,930, Jan. 27, 1938, N. V. de Bataafsche Petroleum Maatschappij, Purifying Fats, Oils, and Waxes. - Fats, etc., of the ester type are refined by extracting with an amine free from OH groups in the presence of H_2O. Fat acids, mucins, color, and odoriferous constituents are removed.

Thus, cacao butter is agitated at 30-100° C. with ethylenediamine, trimethylamine, or cadaverine containing equimolecular amounts of H_2O or saturated with H_2O, the mixture is centrifuged or distilled with steam, and the recovered fat is washed and dried. C. A. 32, 5241 (1938).

(564) Brit. 482,434, March 25, 1938, G. Bottaro, Apparatus for the Countercurrent Contact Treatment of Liquids or Finely Divided Solids with Immiscible or Only Partially Miscible Liquids. - The apparatus comprises alternating zones of quiescent and turbulent flow arranged axially in series in a single unit and communicating over their entire cross section, the volume of each turbulent zone being limited substantially to that required for operation of mechanical agitators arranged therein, and each zone of quiescent flow being formed by equidistantly spaced plate-like members or by a plurality of tubular members, the plates or tubes being arranged substantially axially. The apparatus may be used for the treatment of mineral oils with selective solvents, H_2SO_4, fuller's earth, alkali, or propane, the extraction of oils from seeds, the caustification of Na_2CO_3, the production of H_3PO_4, and of lithopane, and the cyanide treatment of Au ore.
C. A. 32, 6913 (1938).

(565) Brit. 484,117, May 2, 1938, Extractol Process, Ltd., Extracting Fats and Fatty Oils. - Fats, etc., are extracted with solvents by dividing the powdered raw materials containing them into a series of superposed zones in an extraction column by means of transverse flat or disked partitions mounted on central rotatable axis. Each partition is provided with an aperture out of vertical registration with the apertures in adjacent disks so that the raw material passes downward in a spiral path around the axis. The main body of the material is held against rotation by a fixed vertical baffle in each compartment that acts as a dam over which freshly exposed material continuously flows. Raw material is fed in at the top of the column and a solvent, e. g., gasoline, is pumped in at the bottom.
C. A. 32, 7760 (1938).

(566) Brit. 484,794, May 5, 1938, Hansa-Mühle A.-G., Extracting Oil Seeds, etc. - In the solvent extraction of solid material, e. g., oil seeds, in a moving sequence of sieve containers, the solvent is introduced by way of reservoirs, one at least of which is provided in each container, whence the solvent flows under a pressure determined essentially by the head of solvent in the reservoir(s) to distributing devices, at least one of which is associated with each container and is connected to the reservoir(s) on the same container, from which distributing devices the solvent issues as a fine rain onto the material in one or other of the neighboring containers in the sequence. C. A. 32, 8180 1938).

(567) Brit. 487,366, June 20, 1938, Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camargue and Helen J. J. Donnier, Extracting Oils by Solvents. - Prior to extraction of oil from castor seeds, earth nuts, or their oil-cakes by trichloroethylene, the seeds, etc., are subjected to the action of heat or a hot fluid, e. g., a current of steam or hot air, to coagulate the mucilaginous matter.
C. A. 32, 9538 (1938).

(568) Brit. 491,106, Aug. 26, 1938, Gesell. zur Verwertung Fauth'scher, (to Fauth Patente A.-G.), Method and Apparatus for Comminuting and Extracting

Fatty Substances, Beet Root, and Fruit. - Oil seeds, etc., are pressed in a pressure worm, with solvent if desired, to form a coherent mass of rope-like form which is then comminuted and spread in a thin layer, with additional solvent if necessary, upon a traveling filter band through which the extract passes. *C. A.* *33*, 1167 (1939).

(569) Brit. 492,677, Sept. 26, 1938, D. Traill and Imperial Chemical Industries, Ltd., *Artificial Filaments, Films, and Other Shaped Articles.* - In the hardening process involved in the preparation of peanut protein fibers, the filaments, already treated with aqueous formaldehyde, are treated with gaseous sulphur dioxide at elevated temperatures (80° C.) or with solutions of sulphur dioxide in organic solvents (benzene, toluene, ligroin).
I. C. *21*, 73 (1945).

(570) Brit. 492,895, Sept. 26, 1938, D. Traill and Imperial Chemical Industries, Ltd., *Artificial Filaments, Films, and Other Shaped Articles.* - Filaments, etc., made from casein or vegetable protein solutions by coagulation and hardening with CH_2O or one of its near conversion products are treated with HCl or with a reactive Cl compound hydrolyzable to yield HCl ether in the form of a gas or vapor or in a solution in a nonaqueous solvent indifferent to the protein and the Cl compound, whereby the resistance to hot acids, including acid dye baths, or the H_2O-repellent properties of the articles are improved. Among examples, (1) filaments obtained by extruding a solution of groundnut protein into a coagulating bath and hardening by treatment with CH_2O are immersed in hank form in a solution of $SOCl_2$ in C_6H_6, washed, and dried, and (2) hanks of casein filaments hardened with CH_2O are subjected to treatment with oxalyl chloride or $SOCl_2$ vapor.
C. A. *33*, 1936 (1939).

(571) Brit. 494,540, Oct. 27, 1938, Soc. Anon. Etablissements A. Olier, *Columns for the Extraction of Solid Substances, Seeds, with Solvents in Countercurrent.* - These consist of a column, preferably of rectangular cross section, containing 1 or more vertically mounted sets of inclined perforated baffles, the baffles in each set having the planes parallel and the planes of 1 set being inclined in the opposite direction to those of the other set, whereby the raw material follows a zigzag path.
C. A. *33*, 2780 (1939).

(572) Brit. 495,332, Nov. 10, 1938, D. Traill and Imperial Chemical Industries, Ltd., *Treating Protein Materials.* - Filaments, films, and other shaped articles made from protein solutions by coagulation and treatment with a hardening material, e. g., CH_2O, are improved in their resistance to hot acids and (or) in their H_2O-repellent properties by being subjected to the action of a volatile anhydride or ketene of an aliphatic acid. Thus, ground nuts are extracted with a saline or alkaline solution and the protein is precipitated from the solution with SO_2, then dissolved in an aqueous solution of urea, and after being aged, spun into a bath containing $(NH_4)_2SO_4$, H_2SO_4, glycerol, $ZnCl_2$, and H_2O, the filaments so formed being hardened with CH_2O, dried, and subjected in the form of threads, etc., to the action of Ac_2O vapor. *C. A.* *33*, 2626 (1939).

(573) Brit. 497,547, Dec. 21, 1938, A. Nyrop, *Extracting Oils.* - In extracting palm oil and similar vegetable oils, the liquor or pulp containing the oil is passed through shock strainers or vibrating screens before admission

into a centrifugal separator of the type described in Brit. 302,685, 312,997, and 400,809 (C. A. 28, 1895), wherein the sludge deposited in the bowl is discharged periodically through peripheral openings.

C. A. 33, 4070 (1939).

(574) Brit. 502,710, Mar. 23, 1939, Courtalds, Ltd. and Robert Louis Wormell, Artificial Filaments, Threads, etc. - Filaments, etc., are produced from casein or like protein substances by extrusion through jets and, after being preliminarily hardened, are subjected to a stretching and further hardening process without being allowed to contract. The stretching is performed in the presence of H_2O or an aqueous solution, as of a lower fatty acid, or of the hardening solution. Hardening agents are CH_2O vapor and solutions of natural or synthetic tanning agents, CH_2O, and normal or basic Al salts, particularly a solution of CH_2O and $(AcO)_3Al$. Me_2CO or alcohol is added to lower the specific gravity and $CaCl_2$ or Na_2SO_4 to prevent swelling of the threads. Contraction after stretching is prevented by drawing the threads through the hardening bath at the same speed as they leave the stretching device, or by winding them on reels or bobbins after saturation with the hardening liquid.

C. A. 33, 7128 (1939).

(575) Brit. 507,465, June 15, 1939, Hansa-Mühle A.-G., Solvent Extraction of Seeds, etc. - In an extraction process wherein sieve-bottom containers holding the raw material mounted on an endless conveyor are treated with solvent, solvent supplied to each container equals or exceeds the amount passing out through the bottom so that the container is filled with solvent during a substantial part of the cycle. The outflow of solvent through the container is controlled by adjustable openings therein.

C. A. 34, 656 (1940).

(576) Brit. 512,660, Sept. 22, 1939, Hippolyte Marcel Lamy-Torrilhon, Process and Apparatus for the Continuous Treatment of Solid Materials by Means of Solvents. - The solid material and liquid solvent move in opposite directions over the whole or the part of the length of an extraction chamber, the movement of the solvent through the material being caused by the forcing action of a pump or the like injecting into the extraction chamber a measured quantity of solvent per unit of time while the movement of the material takes place solely by gravity to the exclusion of any propelling members or like device likely to cause pulverization or trituration thereof.

C. A. 35, 667 (1941).

(577) Brit. 513,896, Oct. 25, 1939, Andrew McLean and Imperial Chemical Industries, Ltd., Extraction of Protein from Peanuts. - To an agitated aqueous suspension of finely divided blanched or unblanched nuts from which the bulk of the oil has been removed there is added progressively an aqueous solution of an alkaline substance, e. g., NaOH, Na_2CO_3, Na_2S, in such manner that the pH of the mixture never exceeds 8.5 and finally remains at 8.0-8.5, the insoluble matter is separated from the aqueous phase, and the dissolved protein is recovered, e. g., by the controlled addition of SO_2.

C. A. 35, 2645 (1941).

(578) Brit. 513,910, Mar. 21, 1938, E. C. Fieldsend, W. H. D. Boyes, and Imperial Chemical Industries, Ltd., Treatment of Films, Filaments, Fibres, or Other Shaped Articles Made by Hardening Proteins Coagulated from their

Solutions. - In the hardening process involved in the preparation of peanut protein fibers, the filaments are treated with an aqueous solution of a highly soluble halide of an alkali, e. g., sodium chloride, or ammonium or magnesium halides containing a small concentration of a hydrogen halide, e. g., hydrochloric acid, and a small concentration of formaldehyde.

I. C. 21, 73 (1945).

(570) Brit. 515,454, Dec. 5, 1939, A. McLean, (to Imperial Chemical Industries, Ltd.), Making Felted or Woven Fibrous Materials Impermeable to Water. - The textile material is impregnated with a suitably diluted solution obtained by treating an alkali-soluble vegetable protein extracted from peanuts (Arachis Hypogaea) with Al formate. Among examples, a waterproofing compound is prepared by stirring 20 parts alkali-soluble peanut protein in 170 water, adding 63 Al formate, maintaining the temperature for 1½ hrs. at 70° (during which time the protein goes into solution), and cooling.

C. A. 35, 6129 (1941).

(580) Brit. 518,324, Sept. 6, 1938, E. C. Pattee, (to Nat. Distillers Products Corp.), Continuous Solvent-Extraction Apparatus. - An endless conveyor running in a vertical plane and surrounding the extraction vessel and feed device for solids serves both to remove extracted solids from the lower outlet and to pump liquid into the extractor through the same aperture.

Br. A. B, 418 (1940).

(581) Brit. 524,090, July, 30, 1940, D. Traill, R. V. Seddon, W. Sever, and Imperial Chemical Industries, Ltd., Artificial Fibers from Protein Material. - A thixotropic viscous solution is made by a heat-treatment that comprises maintaining at a temperature not below about 60° a dispersion of peanut protein in dilute NH_4OH until an increase of viscosity at least of the order of 5-fold has been obtained. This viscous solution of about 1-25% protein is extruded into suitable coagulating baths such as acid solutions or acidified saline solution. The fibers may be aftertreated with HCHO.

C. A. 35, 6466 (1941).

(582) Brit. 526,047, Sept. 10, 1940, E. Lawrence, Extracting Oil from Oleaginous Material. - The apparatus comprises an upright chamber shell preferably tapering upward. At its upper end there is an inlet for the oleaginous material and an outlet for the solvent; at its lower end there is an inlet for solvent and a lateral discharge mouth, the mouth having side opening therein within the shell. A horizontal screw is arranged transverse of the lower end.

C. A. 36, 1514 (1942).

(583) Brit. 526,237, Sept. 13, 1940, Viktor Merz, Extraction Apparatus. - Structural details. Material such as fine-grained and powdered materials are treated therein with liquid agents.

C. A. 35, 6841 (1941).

(584) Brit. 536,088, May 2, 1941, Sandoz, Ltd., Artificial Protein Fibers. - Artificial protein fibers containing Cr oxide are produced by subjecting fibers manufactured from solution of protein substances to a treatment with compounds of chromic anhydride, and subjecting subsequently the fibers thus treated to the action of reducing agents.

C. A. 36, 1501 (1942).

(585) Brit. 536,104, May 2, 1941, Sandoz, Ltd., Treating Artificial Fibers. - Artificial fibers manufactured from solutions of protein substances such as casein, keratin, and the like are subjected at a temperature above 50° C. to a treatment with compounds of trivalent Cr and, if necessary, to a subsequent treatment with acid-binding agents. The treatment increases the resistance of the fibers to physical and chemical agents without impairing their tinctorial properties.
C. A. 36, 1501 (1942).

(586) Brit. 537,740, July 4, 1940, J. P. Dickson, Wm. Sever, and Imperial Chemical Industries, Ltd., Solutions for the Manufacture of Artificial Fibers. - Peanut globulin is maintained for a period of time in a solution of pH at least 12.5 when fresh, made up from the globulin at its iso-electric region with an aqueous inorganic alkaline solution of sufficient alkali concentration to raise the pH value directly to that value as observed on testing the freshly made solution. The amount of NaOH required per 100 parts of H_2O may be taken as 0.16 part plus 0.036 part per part globulin employed, calculated as globulin dried to constant weight in air at 100°. The solution can be extruded into a bath containing H_2O, Na sulfate, and H_2SO_4. The globulin solution is aged a few hrs. at room temperature before spinning.
C. A. 36, 1789 (1942).

(587) Brit. 543,586, Mar. 4, 1942, D. Traill, Filaments from Vegetable Globulin. - In the hardening process involved in the preparation of peanut protein fibers, the filaments are kept under tension for a period to avoid the contraction which would take place if the tension were released.
I. C. 21, 73 (1945).

(588) Brit. 547,772, Sept. 10, 1942, Allen and Hanburys, Ltd. and E. K. Samways, Continuous Extraction Apparatus. - Extractors, such as are used in laboratories and also extractors suitable for industrial used of one or 2 tons capacity, are described.
C. A. 38, 281 (1944).

(589) Brit. 549,683, Dec. 2, 1942, E. I. du Pont de Nemours & Co., A. A. Levine, and R. J. Dent, Extraction Apparatus. - A countercurrent extraction apparatus is described for extracting soluble materials, such as fats, oils, and waxes, from solid particles by means of a liquid solvent.
C. A. 38, 664 (1944).

(590) Brit. 559,045, Feb. 2, 1944, L. von Roll A.-G., (to Kommunale Anlagen and Egon Böhm), Apparatus for the Extraction of Oils, Fats, and Wax from Solids by Liquid or Vaporized Solvents.

(591) Brit. 569,496, May 28, 1945, C. F. Dinley, Apparatus for the Solvent Extraction of Oils, Fats, and Resins from Solid Matter. - Cf. U. S. 2,377,135.
C. A. 41, 6069 (1947).

(592) Brit. 569,498, May 28, 1945, C. F. Dinley and W. L. McCracken, Extraction of Fats, Oils, and Resins from Vegetable Material. - The invention relates to methods and apparatus described in Brit. 569,496. The complete recovery of the volatilized solvent is made possible.
C. A. 41, 6069 (1947).

(593) Brit. 569,499, May 28, 1945, C. F. Dinley and W. L. McCracken, Extraction of Fats, Oils, and Resins from Vegetable Material. - The noncondensable gases which are released with the solvent vapors in different portions of the apparatus during the processing are eliminated.

C. A. 41, 6069 (1947).

(594) Brit. 570,908, July 27, 1945, S. N. McGeoch and Imperial Chemical Industries, Ltd., Peanut Protein. - Viscous alkaline solutions of substantial globulin concentration, such as are used for the production of artificial protein filaments by wet spinning, are produced from peanut globulin. The peanut globulins are prepared by extracting the globulins from comminuted peanut material containing no appreciable amount of fragments of testa. The comminuted peanut material is treated with a dilute alkaline solution of such concentration that a pH of at least 11.0 is maintained during the extraction of the globulins. The alkaline extract is then separated from the undissolved matter and subjected to treatment adapted to precipate the globulins.

C. A. 40, 6827 (1946).

(595) Brit. 584,272, Jan. 10, 1947, R. A. Bellwood, (to Rose, Downs, & Thompson, Ltd.), Process and Apparatus for Extraction of Oil or Fat by Solvents. - An apparatus for the extraction of oil or fats from oleaginous seeds, nuts, or the like by solvents is described in which the extracted solid material is subjected to agitation upon a vibratory screen prior to drying. The screen shakes out a large percentage of solvent miscella, using a minimum amount of power and without compressing the meal; this permits the remaining solvent and water to be easily driven off.

C. A. 41, 3311 (1947).

Canadian

(596) Can. 181,836, Jan. 29, 1918, Henri Engle, Apparatus for Extracting Oil.

(597) Can. 353,348, Oct. 1, 1935, W. S. Butterfield, (to The Farm Foods, Ltd.), Oil Extraction. - Animal or vegetable matter is pulped, air and moisture are removed by heating in vacuo, and the residue is extracted with a solvent.

O. & S. 13, 22 (1936).

(598) Can. 378,341, Dec. 13, 1938, C. Gower, Extraction of Oils, Fats, and Waxes. - The oil, fat, or wax is extracted by means of a paraffin hexane to nonane inclusive, at 60°; the solute and solvent separated from the raw material are heated at about 150°, the resulting vapors cooled and condensed, and the condensate is returned as solvent; superheated steam at 150° is passed through the residue, the resulting vapors are cooled and demulsified, the two liquid components collected and separated, and the lighter portion is returned as solvent. An apparatus is described.

C. A. 33, 2358 (1939).

(599) Can. 428,372, June 26, 1945, C. F. Dinley (to Detroit Rex Products Co.), Extraction Apparatus. - Structural details are described of an appa-

ratus having a conveyor mounted in a horizontal channel, and means for feeding liquid solvent at one end and for discharging liquid and charging solid at the other end of the channel.

C. A. 39, 3981 (1945).

(600) Can. 428,374, June 26, 1945, C. F. Dinley and Wm. L. McCracken, (to Detroit Rex Products Co.), Extraction of Fats and Resins. - In the continuous extraction of fats and resins (e. g., from soybean meal), in which comminuted material is fed from a storage supply into a horizontal extraction tube and continuously advanced in a counterflowing solvent, the solvent vapors with the uncondensable gases released in the extraction and in the drying of the leached material are passed through a forward-moving supply of the dry, unextracted meal to recover the volatilized solvent by adsorption and absorption, the uncondensable gases being vented to the atmosphere. An apparatus is described.

C. A. 39, 4243 (1945).

(601) Can. 428,376, June 26, 1945, C. F. Dinley and Wm. L. McCracken, (to Detroit Rex Products Co.), Extraction Apparatus. - Oils, fats, resins, etc., are extracted from comminuted materials, e. g., flaked soybeans, by continuously introducing liquid solvent at one end of a closed horizontal extractor, continuously discharging oil-laden solvent from the opposite end, and continuously advancing the divided material countercurrent to the solvent flow.

C. A. 39, 39 (1945).

French

(602) Fr. 35,449, June 20, 1928, Maschinenfabrik und Apparatebauenstalt, (to Schlotterhose & Company), Apparatus for Extracting Oil from Oleaginous Substances.

(603) Fr. 646,249, May 12, 1927, Andria Acquarone, Apparatus for Extracting Oil from Fruit and Oleaginous Grain.

(604) Fr. 659,034, Aug. 14, 1928, Prosco Oils Corp., Apparatus for Extracting Fats and Oils from Oleaginous Materials.

(605) Fr. 672,715, July 20, 1928, P. DuMortir Freres, Apparatus for Extracting Fatty Substances from Linseed, etc.

(606) Fr. 673,644, Aug. 4, 1928, Soc. Anon. des Ateliers Armond et Deoune, Apparatus for Extracting Oil from Oleaginous Substances.

(607) Fr. 682,987, Oct. 9, 1929, Kichji Yoshida, Oil Extraction. - Oil is extracted from soybeans or other vegetable substances by heating the substance during soaking in a bath of soybean oil or other oil not containing water and pressing in known manner.

C. A. 24, 4650 (1930).

(608) Fr. 697,296, June 12, 1930, P. L. Fauth, G. m. b. H., Apparatus for Extracting Oily Substances from Grain, etc.

(609) Fr. 705,306, Nov. 10, 1930, F. A. Combe, Apparatus for Extracting Oleaginous Seeds with Volatile Solvents.

(610) Fr. 712,398, Mar. 2, 1931, K. Hildebrandt, Apparatus for the Continuous Extraction of Oils and Fats from Substances Containing Them.

(611) Fr. 715,874, Apr. 22, 1931, E. Böhm, Apparatus for Extracting Oils, etc., from Solids.

(612) Fr. 770,153, Sept. 10, 1934, Fried. Krupp Grüsenwerk A.-G., Apparatus for Continuous Extraction of Vegetable Oils and Fats. - The materials and extracting agents pass into countercurrent through two concentric cylindrical vessels.

C. A. 29, 630 (1935).

(613) Fr. 773,415, Nov. 17, 1934, K. Sohler, Continuous Apparatus for Extracting Oil from Seeds, etc. - In apparatus consisting of a series of extractors for treating seeds and other oil-containing materials in countercurrent with a solvent, the first extractor consists of a chamber in which is mounted a perforated feed pipe through which the material passes into a second extractor.

C. A. 29, 1671 (1935).

(614) Fr. 806,493, Dec. 17, 1936, Ges. zur Verwertung Fauth'scher Patente m. b. H., Extracting Oleaginous Grains, etc. - Apparatus is described for carrying out the grinding in the presence of the solvent for the fat or oil.

O. & S. 14, 218 (1937).

(615) Fr. 810,462, Mar. 22, 1937, Hansa-Mühle A.-G., Apparatus for Continuously Extracting Oleaginous Seeds.

(616) Fr. 813,170, May 27, 1937, Extractol Process, Ltd., Apparatus for Extracting Oil, Fats, or Other Soluble Constituents from Materials by Solution.

(617) Fr. 821,972, Dec. 17, 1937, Duchscher & Cie, Apparatus for Extracting Oil from Oleaginous Seeds by Steam and Hot Water.

(618) Fr. 829,231, June 16, 1938, P. L. Fauth A.-G., Patente m. b. H. Apparatus for Grinding Oil-Bearing Seeds and Extracting Liquid Constituents.

(619) Fr. 820,077, Nov. 2, 1937, N. V. de Bataafsche Petroleum Maatshappij, Treatment of Essential Oils. - Essential oils are concentrated or purified by simultaneous extraction with two solvents (A and B) which are not completely miscible with one another under the extraction conditions. Solvent A is a polar solvent which preferentially dissolves the nonhydrocarbon con-

stituents of the oil and which boils at a temperature below the b. p. of those constituents. The numerous specified solvents of this type include liquid NH_3 or SO_2, MeOH, EtOH, acetone, HCOOMe, halogenated lower alcohols or ketones, $PhNH_2$, $PhNO_2$, and AcOPh. Mixtures of such solvents with one another or with Et_2O may also be used. Solvent B consists entirely or mostly of one or more liquid or liquefied hydrocarbons b. at a temperature different from the b. p. of the essential oil constituents. Specified solvents of this type include liquefied propane, light gasoline, benzene, and cyclohexane. The treatment may be effected with the addition of a small proportion of water, to reduce the miscibility of the solvents. The two solvents are preferably moved in counterflow through the oil, and the temperature and other conditions are so selected that two liquid phases are obtained; these are then separately worked up. Numerous details are given, apparatus is described, and examples of the treatment of lemon oil, orange oil, and ginger oil are included.

C. A. 32, 3093 (1938).

(620) Fr. 825,351, Mar. 2, 1938, Soc. Anon. Etablissements A. Olier, Reaction or Extraction Column for Continuous Working.

(621) Fr. 842,606, June 15, 1939, Societe Nouvelle des Usines de la Chaleassiere, Apparatus for the Separation of Sludge from Liquids. - The apparatus consists of two or more receivers entirely or partially in form of funnels, disposed coaxially, and placed in a manner that enables the solid particles of the sludge to deposit.

C. A. 34, 5705 (1940).

(622) Fr. 846,315, Sept. 14, 1939, J. Quintin-Toronelli, Molding Powder. - A molding powder prepared by mixing synthetic resin such as the condensation product of phenols and CH_2O with protein materials of vegetable or animal origin, especially ground peanuts from which the oil has been removed.

C. A. 35, 1144 (1941).

German

(623) German Registered Patent, expired, July 19, 1923, O. Rosenthal, Process for Extraction of Materials Containing Oil and Fat.

(624) Ger. 50,360, June 13, 1889, W. Grillo and M. Schroeder, Concerning the Extraction Process of Fats and Oils.

(625) Ger. 179,449, Jan. 3, 1902, Nassextraktion, Ltd., Process of Extracting Fat and Wax from Damp Raw Materials. - Process of extracting fat and wax from damp raw materials, consisting in treating them in an extraction apparatus with the vapors of such solvents, whose boiling points are below 100°C., as benzene, carbon bisulphide, acetone, alcohol, chloroform, carbon tetrachloride, or ether, excepting benzine, and condensing in a special receiver the vapors of the solvent, in the known manner, with the water vapors.

C. A. 1, 1653 (1907).

(626) Ger. 243,243, Jan. 10, 1911, C. F. von Girsewald, Extraction of Bones, Glue, Leather, and Similar Materials, with Volatile Solvents, in Vacuo.

(627) Ger. 269,195, May 12, 1912, Harburger Ölwerke, Brinckman, and Mergell, Process for Obtaining Oil from Oil-Seeds. - In a process of obtaining the oil from oil-seeds and the like, the seeds are treated, before or after the separation of the oil, together with extraction agents, with aliphatic, O-containing compounds, which contain the methylene group. Especially suited is HCHO, the addition of which may be before or after the extraction, e. g., 5 l. of a 40% HCHO solution in H_2O may be added to 1400 l. of benzine, and this mixture added to the seeds to be extracted. The extraction is effected in closed vessels heated to 100-120°C. The separation proceeds slowly, and the extract is stable for a long time. The residues may be used as fodder. After extraction, the small amount of HCHO goes over with the benzine upon distillation. Instead of HCHO, compounds containing HCHO may be used, as the bisulfite compounds, and sulf-oxylates. HCOOH may also be used, or hexamethylenetetramine and other compounds which yield HCHO. Instead of HCHO, may also be employed acetaldehyde, acrolein, and chloral, of which 2-3% are added to the fat solvent. In pressing out the oil, the usually appearing slimy property of the oil is prevented by the addition of HCHO. C. A. 8, 2272 (1914).

(628) Ger. 284,410, Dec. 3, 1913, Chem. Fabrik von Heyden, A.-G., Extracting Fats of All Kinds, Hydrocarbons, Sulfur, and the Like. - Extracting fats of all kinds, hydrocarbons, sulfur, and the like, with the use of the natural phosphoric acid esters of the phenols, and substituted phenols, especially the cheap tricresyl phosphate and its substitution products as the extracting agent. The extraction is made with hot solvent. The separation of the dissolved substances from the resulting solution is effected by cooling of the solution and the mechanical separation of the deposited products or by distillation under reduced pressure. If vulcanized rubber be digested with tricresyl phosphate, the S dissolves, while the rubber remains as an elastic mass. C. A. 9, 3340 (1915).

(629) Ger. 303,846, Dec. 30, 1919, The Countercurrent Process for the Extraction of Fat and Oil From Raw Material.

(630) Ger. 309,555, Nov. 25, 1918, C. Schwalbe, Process for Producing Fat, Wax, Resins, etc., from Vegetable Cellulose-Containing Materials.

(631) Ger. 322,446, July 2, 1920, The Countercurrent Process for the Extraction of Fat and Oil from Raw Material.

(632) Ger. 366,923, Jan. 13, 1923, Apparatus for Extraction of Fine Oil-Bearing Material.

(633) Ger. 377,216, June 14, 1923, M. Whitehead, Extracting Oil from Vegetable Meals. - Crushed seed meal or similar oil-bearing material is intimately mixed with a solvent and the material and solvent are moved countercurrentwise continuously through an extraction apparatus which subjects the material to intermittent wringing and to a final solvent vaporization. C. A. 17, 1557 (1923).

(634) Ger. 378,550, July 19, 1923, O. Rosenthal, *Process for Extraction of Materials Containing Oil and Fat.* - The solvent passes through the material to be extracted in the form of vapor, which is continually passing through a closed circuit. On leaving the material being extracted, the mixture of steam and solvent vapors is subjected to fractional condensation. The pressure in the apparatus is maintained below that of the atmosphere by means of temporary partial condensation of the solvent vapors. The solvent vapor is freed from fatty matter on leaving the extractor. The air contained in the plant at the commencement of operations is displaced through a condenser until the solvent vapors contained in it and condensed in this condenser operate a sealing device which closes the passage to the outer air and causes the vapors to travel in their normal circulation. The solvent vapor is alternately introduced at the top and bottom and discharged at the middle, and introduced at the middle and discharged at the top and bottom of the extractor. Great economy of heat and steam is effected, and the time of extraction is shortened by this invention. Complicated air-pumps are also rendered unnecessary.

J. S. C. I. B, 23 (1924).

(635) Ger. 386,036, Dec. 1, 1923, S. Zipser, *Process and Apparatus for Extraction with Volatile Solvents.*

(636) Ger. 393,072, Aug. 30, 1922, H. Bollmann, *Production of Cottonseed Oil.* - The cottonseed is first treated with dilute alcohol and then extracted with a known solvent. Light brown oils are obtained in this way which are equivalent to the best American oils obtained by pressing fresh seed.

Br. A. B, 603 (1924).

(637) Ger. 398,486, Mar. 29, 1922, Soc. Anon. des Establ. A. Olier, *Plant for Continuous Extraction of Oils and Fats from Stone Fruit.* - The apparatus consists of a jacketed tube fitted with two oppositely-set, perforated helical agitators, touching each other and the walls of the tube, and revolving in opposite directions, thereby carrying the material to be extracted upwards against the descending solvent. The material to be extracted may be delivered to the vertical tube through horizontal tubes fitted with similar helical conveyors. The solvent is added through the hollow perforated conveyor shaft, falls through the apparatus by its own weight, and passes through a filter to the distillation apparatus.

J. S. C. I. B, 952 (1924).

(638) Ger. 405,395, Oct. 31, 1924, Solvent Extraction Refrigeration Co., *Process for Extraction of Fats, Oils, Essential Oils, etc., from Materials in Which They are Contained.*

(639) Ger. 453,253, Dec. 5, 1927, Simon Brothers, Ltd., *Machine for Extraction of Oils, Fats, Waxes, and Other Odoriferous Materials.*

(640) Ger. 454,822, Jan. 18, 1928, *Process and Apparatus for Separation of Oil from Oil-Containing Material.*

(641) Ger. 464,554, Aug. 29, 1923, J. D. Riedel and E. DeHaen, *Soybean Oil.*

(642) Ger. 467,801, Dec. 10, 1925, Freid. Krupp Grüsonwerk Akt.-Ges., *Apparatus for Extracting Oil from Oil-Containing Materials.*

(643) Ger. 471,076, July 6, 1926, M. Luther and K. Pieroh (to I. G. Farbenindustrie A.-G.), *Purifying Oils.* - The lower alkyl formates or mixtures thereof are used as extracting agents in the purification or separation of oils. Examples are given describing the deacidification of sesame oil, the refining of a Mexican crude oil distillate, and the extraction of a resin from the residues left after distilling the destructive hydrogenation products from a crude mineral oil, HCOOMe being the reagent in each case.
C. A. *23*, 2313 (1929).

(644) Ger. 474,543-4, Aug. 29, 1923, J. D. Riedel and E. DeHaen, *Soybean Oil.* - The waste products of soybean oil production are extracted with alcohol and then with acetone to obtain the oil, lecithin, phosphatide, and mucin therein.
C. A. *23*, 5054 (1929).

(645) Ger. 485,625, Nov. 6, 1929, G. Wacker, *Preparation of a Residue from Extraction of Fat-Containing Plant or Animal Material Applicable to Feeding.*

(646) Ger. 495,809, June 22, 1927, L. J. Simon and Simon Extracting Syndicate, *Apparatus for the Recovery of Oils and Fats from Solvents.*

(647) Ger. 505,354, Dec. 22, 1927, H. Bollman and B. Rewald, *Vegetable Oils; Lecithin.* - In extracting oils and lecithin from oleaginous seeds, especially soybeans, a better product is obtained by preliminarily treating the disintegrated seeds for a short time with concentrated MeOH or EtOH.
C. A. *24*, 6048 (1930).

(648) Ger. 519,830, Dec. 15, 1927, E. Silvano and V. Lombardi-Cerri, *Degreasing or Washing Solid Materials.* - The material is placed in a tube which permits the degreasing, etc., fluid to pass through, and the tube is fed through several vessels containing the degreasing, etc., fluid.
C. A. *25*, 3415 (1931).

(649) Ger. 520,396, June 22, 1927, L. J. Simon and Simon Brothers (Engineering, Ltd.), *Apparatus for Distilling and Recovering Solvents Used in Oil Extraction.*

(650) Ger. 521,541, Feb. 20, 1927, Maschinen- und Apparatebau-Ges., Martini and Hüneke, m. b. H., *Countercurrent Column.* - Details of a column used for extraction, solution, etc., are given.
C. A. *25*, 3206 (1931).

(651) Ger. 523,826, Dec. 5, 1928, K. F. Wilhelm, *Apparatus for the Continuous Extraction of Material Containing Oil.* - Details are given.
C. A. *25*, 3824 (1931).

(652) Ger. 524,485, Sept. 18, 1927, P. H. Müller, Apparatus for Dissolving or Extracting Solids, with Liquids and Solid Circulation.

(653) Ger. 525,724, Feb..22, 1903, H. H. Lemmel, Device for the Continuous Extraction of Oils and Fats from Raw Materials by Solvents. - Details of arrangement are given.
C. A. 25, 4728 (1931).

(654) Ger. 528,121, Aug. 25, 1928, C. Kimmel and Co., Continuously Working Enclosed Plant for Extracting Oils and Fats with Solvents.

(655) Ger. 528,287, Feb. 22, 1929, K. Hildebrandt, Counterflow Apparatus for Extracting Oils and Fats with Solvents.

(656) Ger. 529,142, June 15, 1929, P. L. Fauth, G. m. b. H., Continuously-Operating Extracting and Filtering Apparatus for Oleaginous Seeds.

(657) Ger. 532,187, Aug. 12, 1928, Prosco Oils Corp., Apparatus for Extracting Oils and Fats.

(658) Ger. 537,530 (Addn. to 529,142), Dec. 8, 1929, P. L. Fauth, G. m. b. H., Continuously-Operating Extracting and Filtering Apparatus for Oleaginous Seeds.

(659) Ger. 542,942, April 10, 1927, J. Savage, Removing Fat from Raw Materials Containing Water. - Details are given of apparatus in which the materials are treated with a fat solvent.
C. A. 26, 3130 (1932).

(660) Ger. 543,140, Aug. 5, 1928, Schlotterhose and Co., Counterflow Apparatus for Extracting Oils and Fats, etc.

(661) Ger. 547,040 (Addn. to 528,287), Feb. 12, 1931, K. Hildebrandt, Counterflow Apparatus for Extracting Oils and Fats.

(662) Ger. 551,101, Oct. 20, 1929, K. Wilhelm, Extracting Oils and Fats. - In extracting oils or fats from fish or flesh, the material is dried prior to extraction by treatment with substantially anhydrous acetone.
C. A. 26, 4494 (1932).

(663) Ger. 551,102, Apr. 23, 1930, K. F. Wilhelm, Extracting Oils and Fats. - The methods of Germ. 551,101 and 552,284 are applied to the treatment of vegetable materials. The acetone may be replaced in part by other solvents. Examples are given. C. A. 26, 4494 (1932).

(664) Ger. 552,284, Apr. 23, 1930, K. F. Wilhelm, Extracting Oils and Fats. - Dehydration of the initial materials with substantially anhydrous acetone,

as described in Ger. 551,101, is preceded by partial dehydration with aqueous acetone.

C. A. 26, 4494 (1932).

(665) Ger. 563,711, Mar. 1, 1931, O. Gieske (to Bamag-Meguin A.-G.), Countercurrent Extraction Apparatus for Heavy and Light Solvents.

(666) Ger. 572,818, Mar. 23, 1933, H. Mühlenwerke A.-G., Extraction Apparatus.

(667) Ger. 578,704, June 16, 1933, E. Böhm, Apparatus for Lixiviating Solid Materials.

(668) Ger. 589,233, Dec. 4, 1933, H. Mühlenwerke A.-G., Continuous Apparatus for Extracting Fatty Oils, etc.

(669) Ger. 595,187, Feb. 2, 1934, J. Veigh (to I. G. Farbenind. A.-G.), Apparatus for Extracting Fats or Fatty Oils.

(670) Ger. 602,272, Sept. 4, 1934, K. Sohler, Continuous Apparatus for Extracting Oil from Seeds, etc. - In apparatus consisting of a series of extractors for treating seeds and other oil-containing materials in countercurrent with a solvent, the first extractor consists of a chamber in which is mounted a perforated feed pipe through which the material passes into a second extractor.

C. A. 29, 630 (1935).

(671) Ger. 623,275, Dec. 17, 1935, K. F. Wilhelm, Continuous Counterflow Apparatus for Extracting Oleaginous Seeds, etc., with Liquid Solvents.

(672) Ger. 633,917, Aug. 12, 1936, Fried. Krupp Grüsonwerk A.-G., Apparatus for the Continuous Extraction of Materials with a Solvent.

(673) Ger. 634,152, July 2, 1938, W. Engler (to Hansa-Mühle A.-G.), Continuous Extraction Apparatus Comprising a Number of Superimposed Sieve-Boxes Through Which Solvent Flows.

(674) Ger. 636,093, Oct. 3, 1936, W. Lill, Rotary Apparatus for Extracting Oils from Seeds, etc. - Continuous solvent extraction.

C. A. 31, 898 (1937).

(675) Ger. 639,775, Dec. 17, 1936, H. Scholler, Apparatus for Extracting Vegetable Materials Under Pressure.

(676) Ger. 646,189, June 9, 1937, Hansa-Mühle A.-G., Counterflow Extraction Apparatus, Particularly for Obtaining Oils from Oleaginous Fruits. - Con-

tinuous solvent extraction. The apparatus is a development of that described in Ger. 589,233.

C. A. 31, 6496 (1937).

(677) Ger. 659,575, May 6, 1938, Ges. zur Verwertung Fauth'scher Patente m. b. H. (Phillip L. Fauth and Joseph Reichert, inventors), Apparatus for the Continuous Extraction of Oils from Oily Materials. - The charge is passed over a series of swinging or vibrating sieves which are sprayed with solvent. The apparatus also includes means of recirculating solvent and filter for solvent. The swinging or vibrating motion and the pitch of the sieves cause the forward motion of the charge.

O. & S. 15, 299 (1938).

(678) Ger. 668,301, Nov. 30, 1938, A. Lorenz, System for Expelling Volatile Solvents by Means of Steam from Residues from the Extraction of Oils.

(679) Ger. 669,620, Dec. 30, 1938, Edelenau G. m. b. H., Fatty Oils. - Fatty oils are treated with liquid SO_2. The SO_2 extract contains mostly unsaturated constituents, and these are obtained by evaporating off the SO_2 at about 50°C. and treating with soda. The fatty oil raffinate left after separation of the SO_2 extract consists mostly of saturated compounds. These are refined by removing any SO_2 present by distillation or by adding soda, $Ca(OH)_2$, or $Mg(OH)_2$.

C. A. 33, 5692 (1939).

(680) Ger. 670,283, Jan. 16, 1939, Hansa-Mühle A.-G., Continuous, Traveling-Sieve Extraction Apparatus, Suitable for Fatty Oils.

(681) Ger. 671,230, Feb. 3, 1939, E. Bartusch, Continuous Rotary-Drum Apparatus for Extracting, Filtering, and Drying Materials Containing Oils, Fats, Waxes, Tanning Agents, or Other Extractable Substances.

(682) Ger. 671,851, Feb. 18, 1939, Gesellschaft zur Verwertung Fauth'scher Patente m. b. H., Apparatus for Extracting Oil from Seed.

(683) Ger. 679,708, Aug. 12, 1939, W. Engler and W. Depmer (to Hansa-Mühle A.-G.), Continuous Extraction Apparatus. - The apparatus is useful for extracting oils from animal and vegetable materials. Material to be extracted is passed on a sieve through a chamber containing solvent spray.

O. & S. 17, 70 (1940).

(684) Ger. 682,912, Oct. 5, 1939, J. Reichert (to Gesellschaft zur Verwertung Fauth'scher Patente m. b. H., Extraction Procedure. - This is a continuous extraction system which includes repeated grinding in the presence of solvent during extraction.

O. & S. 20, 39 (1943).

(685) Ger. 696,499, Aug. 22, 1940, A. von Heymann, Extraction Installation for Fats and Oils.

(686) Ger. 700,798 (Addn. to Ger. 679,708), Nov. 28, 1940, W. Engel and W. Depmer (Hansa-Mühle Akt.-Ges.), Continuous-Extraction Apparatus.

(687) Ger. 703,560, Feb. 6, 1941, S. Zipser, Equipment for Continuous Extraction of Solids with Solvents.

(688) Ger. 704,290, Feb. 27, 1941, H. Suss (to Rheinmetall-Borsig Akt.-Ges.), Apparatus for Extracting Oils and Similar Materials.

(689) Ger. 710,548, Aug. 7, 1941, F. I. Simon, Vegetable and Animal Extracts Rich in Proteins. - The proteinaceous substances are extracted with glycerol to which citric acid is added.

C. A. 37, 3862 (1943).

(690) Ger. 713,963, Oct. 23, 1941, A. Pfänder (to Maschinen- und Metallwaren-Händels Gesellschaft m. b. H.), Apparatus for Continuous Countercurrent Extraction of Oily or Fatty Substances as Well as of Other Materials.

(691) Ger. 723,222, June 18, 1942, H. Suss, (to Rheinmetall-Borsig. A.-G.), Arrangement for Extracting Solid, e. g., Oily, Substances from Seeds.

(692) Ger. 725,302, Aug. 6, 1942, F. Kaysser (to Metallgesellschaft A.-G.), Obtaining Proteins or Proteinaceous Materials from Solutions Containing Such. - Proteins are precipitated from their solution by an acid or a salt. The supernatent liquid after precipitating a concentrated solution is used for precipitating solutions less concentrated than the original one.

C. A. 37, 5992 (1943).

(693) Ger. 726,949 (Addn. to Ger. 723,222), Sept. 17, 1942, H. Suss (to Rheinmetall-Borsig A.-G.), Apparatus for Continuous Extraction of Solid Oil-Containing Substances, Particularly Seeds.

(694) Ger. 732,294, Feb. 4, 1943, E. Bohm (to L. von Roll Akt.-Ges. für Kommunale Anlagen), Apparatus for Extracting Oils, Fats, Waxes, etc.

(695) Ger. 733,477, Feb. 25, 1943, I. Kazita and R. Inoue (to Showa Sangyo K. K.), Synthetic Fibers Made from Soybean Proteins. - The residue after soybean-oil pressing is leached with a dilute alkaline solution. In the leachate the protein is precipitated with an acid or with a metal salt. The precipitate is then washed with H_2O. The precipitate still containing 75-85% of H_2O is dissolved with NH_4OH. The solution is stabilized with, e. g., sugar and tartaric acid. The solution is matured and spun.

C. A. 38, 1126 (1944).

(696) Ger. 736,281, May 6, 1943, G. Bottaro, Countercurrent Extraction of Liquids or Solids. - The extraction is carried out in a column consisting of alternating stirring and quiescent sections. Structural details are given.

C. A. 38, 2856 (1944).

Japanese

(697) Jap. 36,328, May 7, 1920, N. Gamamots, E. Mouinots, and M. Mouijama, Apparatus for Extracting Oil. - The extraction tower has a perforated false bottom, under which filtering materials are put and over it the sample. Solvent is dropped from the upper part, while hot air is injected from the bottom. These towers are connected in parallel with cooling and collecting vessels, etc.

C. A. 15, 1634 (1921).

(698) Jap. 90,625, Mar. 31, 1931, M. Watanable (to Institute of Physical and Chemical Research), Apparatus for Extraction of Animal or Vegetable Materials by Volatile Solvents. - Structural features.

C. A. 25, 4746 (1931).

(699) Jap. 109,730 (Addn. to 107,890), Feb. 23, 1935, Honen Seiyu K. K. (M. Nakamura, inventor), Extraction of Oils. - Oil-containing material (such as soybean) is extracted with a mixture of MeOH (or MeOH containing a small amount of EtOH) and chlorinated hydrocarbons (such as C_2HCl_3 or $(CH_2Cl)_2$). After extraction, the solvent is separated into two layers; the lower one containing pure oils, while the upper one (MeOH) contains impurities. The residue obtained by the process contains only a small amount of impurities.

O. & S. 13, 91 (1936).

(700) Jap. 109,731, Feb. 23, 1935, Honen Seiyu K. K. (M. Nakamura, inventor), Extraction of Oils. - Alcohol is used in combination with carbon bisulfide in the same manner of operating as described in the preceding patent.

O. & S. 13, 91 (1936).

Norwegian

(701) Norw. 56,720, July 4, 1938, A. Monssen, Extraction of Fats. - Monssen suggested cooling the oil-bearing material to cool water contained in it and maintaining the condition during (solvent) extraction.

O. & S. 17, 163 (1940).

Russian

(702) Russ. 41,100, Jan. 31, 1935, V. G. Leites, Lowering the Oil Content of Castor Oil and Sunflower Oil Press-Cakes. - The oil content of the press-cakes is lowered, and their cohesion is increased by first heating to 40° and then adding 2% of electrolyte (NaOH, ammoniacal Na_3PO_4, and ammoniacal NaF).

O. & S. 13, 294 (1936).

(703) Russ. 770,582, Sept. 17, 1934, E. Böhm, Apparatus for Extracting Oils, etc., with Solvents.

Swiss

(704) Swiss 205,883, Oct. 2, 1939, Flora, Chemische Fabrik, Extraction Process. - The solvent is employed in such a manner and is so chosen that without the addition of external energy the solvent vapor is condensed and its heat of vaporization is entirely or partially given up with vaporization of the extract solution which contains other solvents.
C. A. 35, 2753 (1941).

U. S. Patents

(705) U. S. 793,464, June 27, 1905, J. McMahon, Process of Extracting Oils, Grease, etc., from Seeds, Wool, etc. - Claim 8. The herein-described process for the extraction of oil from cotton seed, consisting in subjecting the ground seed to the action of a volatile solvent under exclusion of light, heat, and air, to exhaust the seed of the oil, then passing the oil containing the unchanged coloring-matter through a charcoal filter while still excluded from light, heat, and air, and finally separating the volatile solvent from the oil.

Off. Gaz. 116, 2432 (1905).

(706) U. S. 915,169, Mar. 16, 1909, F. Frank, Extraction of Oils and Fats from Unbroken Fruits, Raw Wool, etc. - A continuous current of vapor of a volatile solvent, as a hydrocarbon boiling at 90°, is passed through the material at a temperature below 100° with sufficient rapidity to prevent complete condensation in the material and to volatilize and remove substantially all the moisture present, the latter being led off with the current of uncondensed solvent and the fat recovered from the reflux of condensed solvent. C. A. 39, 1475 (1909).

(707) U. S. 991,491, May 9, 1911, C. Edgerton, Apparatus for Extracting Grease and Oils. - Claim 4. An apparatus of the kind described, comprising an upright container, a removable bottom equal to the cross section of the container, a perforated lining made in vertical sections having ribs on their outer sides to reinforce the same and space the lining away from the container, and adjusting devices for forcing the lining sections inwardly.

Off. Gaz. 166, 267 (1911).

(708) U. S. 1,024,230, April 23, 1912, C. Turner and H. J. Flood (to Charles Turner), Oil-Extracting Device. - Claim 1. In an oil-extracting device, an inclined cylinder, a jacket inclosing a portion of the cylinder, the cylinder walls inclosed within the jacket being foraminous, a hopper delivering to the lower end of the cylinder, a conveyor, means for introducing a solvent into the cylinder.

Off. Gaz. 177, 930 (1912).

(709) U. S. 1,035,815, August 13, 1912, J. Stockhausen, Removing Fat, etc., from Vegetable or Animal Materials. - By treatment with an emulsion containing saponified sulfonated oil and a chloride of a hydrocarbon.

C. A. 6, 3334 (1912).

(710) U. S. 1,076,997, October 28, 1913, R. N. Riddle, Extracting Oil or Fat from Vegetable or Animal Material. - By crushing or grinding with a solvent to form a semi-liquid mass, separating the oil or fat and solution from the solid residue, and subsequently driving off the solvent from both the residue and the solution.

C. A. 8, 436 (1914).

(711) U. S. 1,104,456, July 21, 1914, C. Turner, Extracting Oils from Solid Materials with Volatile Solvents. - Claim 4. Process of treating solid

material for extracting oil therefrom consisting in first washing the material with a volatile solvent, then passing the material through a chamber and heating it therein for vaporizing the solvent remaining in the material, and sealing the port of such chamber against the escape of vapors therethrough by directing into such chamber through such port a vapor under pressure.

Off. Gaz. 204, 862 (1914).

(712) U. S. 1,125,920, January 19, 1915, E. O. Barstow and T. Griswold, Jr., Extracting Oil from Seed Meals, etc. -- By intermittently bringing together in a closed chamber a current of solvent such as CCl_4 and a current of the meal or other material to be extracted so that only a small body of air comes in contact with the material, the oil and other dissolved matter is separated from the solvent by a steam distillation apparatus placed in the solvent-circulation system. C. A. 9, 729 (1915).

(714) U. S. 1,199,861, October 3, 1916, E. O. Barstow and T. Griswold, Jr., Method of and Apparatus for Extracting Oils and the Like. - Claim 1. The combination of a filter having an extended filter surface, means adapted to supply a liquid to different portions of such surface, and separate suction means adapted to cooperate with such filter-surface portions, said liquid-supplying and suction means being connected to pass a current of liquid through such surface portions one to the other.

Off. Gaz. 231, 42 (1916).

(715) U. S. 1,238,084, August 28, 1917, E. O. Barstow and T. Griswold, Jr., Method of and Apparatus for Extracting Oils and the Like. - Claim 1. A supply of the material to be treated and a fluid solvent are continuously mixed and thereupon separated, the step which consists in maintaining the bulk of the mixture substantially constant by returning thereto solvent that has been separated from such material, and automatically regulating the supply of fresh solvent by the proportion of extract in such separated solvent.

Off. Gaz. 241, 922 (1917).

(716) U. S. 1,260,656, March 26, 1918, H. Bollmann, Removing Oily and Bitter Substances from Oil-Bearing Seed Press-Cakes. - Press-cake from soybeans or other oil-bearing seeds is freed from oil and bitter substances by treatment with a solvent mixture containing alcohol and C_6H_6 to prepare it for use as a food. Yeast, maize, or dried fish may be similarly treated.

C. A. 12, 1578 (1918).

(717) U. S. 1,260,887, March 26, 1918, C. Edgerton, Apparatus for Extracting Grease and Oil from Garbage. - Claim 1. In an apparatus for extracting grease and oil from garbage, the combination of a tank-like receptacle, a false bottom within said receptacle comprising a plurality of superposed screen-like members, means for agitating the contents of the receptacle above the false bottom, and means for effecting relative adjustment of the members of the false bottom to render said bottom imperforate.

Off. Gaz. 248, 949 (1918).

(718) U. S. 1,261,005, April 2, 1918, E. O. Barstow and T. Griswold, Jr., Recovering Solvents from Extracted Material. - Residual solvent is recovered

from an extracted material, e. g., in the extraction of oils from solids by the use of CCl_4, by treatment with steam on the countercurrent principle.
C. A. 12, 1589 (1918).

(719) U. S. 1,267,611, May 28, 1918, R. Wells, Extracting Oils from Garbage, Seeds, Fish Refuse, and Other Materials. - Material such as garbage, seeds, or refuse which contains both oil and H_2O is freed from H_2O by heating considerably above 100°C. with a petroleum distillate or other solvent having a higher boiling point than H_2O, and the oil is then extracted by washing the material with a solvent of lower boiling point.
C. A. 12, 1842 (1918).

(720) U. S. 1,293,738, February 12, 1919, C. Edgerton, Apparatus for Extracting Grease and Oils. - Claim 1. In an apparatus of the class described, the combination of a tank-like receptacle having a vertical cylindrical wall, and means for heating said receptacle and the contents thereof comprising a series of coils, and headers to which the ends of said coils are connected, said headers being located outside said vertical wall.
Off. Gaz. 259, 208 (1919).

(721) U. S. 1,341,523, May 25, 1920, K. A. Stahlgren and T. L. Shannon, Apparatus for Extracting Grease from Garbage or Other Organic Materials by the Use of Solvents. - Claim 1. An apparatus for extracting grease from organic matter, comprising a rotatable drum adapted to contain the organic matter, means for heating the drum and its contents, means for introducing a solvent into the drum, and means rotatable in opposite directions to the drum and arranged adjacent to the wall of the drum for agitating the organic matter and the solvent while contained within the drum, said agitator serving as a heating medium.
Off. Gaz. 274, 747 (1920).

(722) U. S. 1,357,365, November 2, 1921, R. Wells, Extracting Oil from Seeds, Garbage, etc. - In extracting oil from seeds, garbage, or similar material, the material is exposed in trays in a closed chamber to the action of a solvent such as CCl_4 or naphtha in which the material is immersed, and the temperature is raised to a point where the combined vapor tensions of the solvent and H_2O present are equal to or greater than the vapor pressure in the chamber, simultaneously to evaporate solvent and H_2O, and solvent is added as required to maintain a constant volume in the chamber.
C. A. 15, 321 (1921).

(723) U. S. 1,376,211, April 26, 1921, R. H. McKee, Extracting Oils, Fats, and Fatty Acids from Sewage. - Sewage or similar material containing oil or the like to be extracted is dehydrated and then treated with liquid SO_2 as a solvent for the oily or fatty material.
C. A. 15, 2683 (1921).

(724) U. S. 1,381,758, June 14, 1921, L. J. Simon and J. W. Hinchley, Apparatus for Extracting Oils, Fats, Grease, Rubber, Sulfur, or other Materials with Solvents. - Claim 1. An apparatus for extracting oil, fat, grease, wax, India rubber, sulfur, and other substances soluble in organic solvents from material containing or yielding the same, comprising a vessel having an extractor and a distiller positioned therein, a charging tube extending

through the top space of the vessel, a strainer positioned around said tube, a condenser tube comminuting with said top space.

Off. Gaz. 287, 324 (1921).

(725) U. S. 1,437,743, December 5, 1923, J. Aril, Apparatus for Extraction of Oils or Fat. - A jacketed extraction chamber for extraction of oils or fats from solid materials is provided with horizontal heating pipes extending through its upper portion to effect uniform heating. The solvent used is repeatedly distilled and returned to the extraction chamber.

C. A. 17, 894 (1923).

(726) U. S. 1,446,606, February 27, 1923, M. Whitehead, Extracting Oil from Vegetable Meals. - Crushed seed meal or similar oil-bearing material is intimately mixed with a solvent, and the material and solvent are moved countercurrentwise continuously through an extraction apparatus which subjects the material to intermittent wringing and to a final solvent vaporization.

C. A. 17, 1557 (1923).

(727) U. S. 1,479,145, January 1, 1924, Jos. and Jas. A. McMahon, Extracting Wool Grease or Other Soluble Substances. - Wool containing grease is conveyed in one direction through a passage-way while heated CCl_4 or other solvent is caused to flow through the passage-way in the opposite direction. The solvent is employed cyclically, being distilled from the extract obtained. Air or other inert gas is used for effecting recovery of the solvent retained by the solid residue, e. g., the degreased wool. An apparatus is described for carrying out this process in an automatic and continuous manner. This apparatus comprises a U-shaped extraction tube and is adapted for extraction of various materials.

C. A. 18, 761 (1924).

(728) U. S. 1,487,449, March 18, 1924, C. F. Eddy, Extracting Fats and Oils. - Finely divided solid material such as cacao powder from which fats or oils are to be extracted is suspended in a solvent for the fat or oil, e.g., in C_6H_6, to effect extraction, and only just sufficient aqueous precipitating agent, e.g., H_2O, is then added to the mixture of solid material and solvent to be absorbed by the solid material so that it settles readily in the solvent without formation of a separate liquid phase.

C. A. 18, 1760 (1924).

(729) U. S. 1,500,957, July 8, 1924, J. Nield, Apparatus for Conditioning Maize or Extracting Oils, Fatty Substance, and Waxes from Various Materials. - Material to be extracted is passed upwardly by a screen conveyor through an inclined extraction cylinder in which it is treated countercurrentwise with a solvent liquid. From the upper end of the extraction cylinder the material passes through a hollow trunnion into a heated solvent recovery cylinder mounted below the extraction cylinder.

C. A. 18, 2621 (1924).

(730) U. S. 1,607,731, November 23, 1927, C. F. Eddy, Recovering Fats and Oils from Vegetable Materials. - Press-cake of peanuts, castor or soybeans, flaxseed, or other oleaginous vegetable material is treated with C_6H_6, acetone, or other volatile solvent for fat and oil, the resulting solution is separated from insoluble residual material by centrifuging in the presence

of added H_2O, and both liquid and residue are continuously withdrawn and the solvent is evaporated.

C. A. 21, 335 (1927).

(731) U. S. 1,628,787, May 17, 1927, A. B. Kennedy, Apparatus for Leaching Wood Chips or Other Materials. - Claim 9. In apparatus having a tank with leaching fluid therein, a series of paddle wheels having blades for moving material through the fluid in the tank, the blades being provided in their free end edges with a series of narrow slots which, when the blades are immersed, are wholly below the level of the material in the tank.

Off. Gaz. 358, 670 (1927).

(732) U. S. 1,653,201, January 20, 1927, H. Bollmann (to M. F. Foster), Preparatory Treatment of Cottonseed (for Extraction of Oil). - Claim 1. A process of preparing cottonseed meats for the extraction of oil which comprises subjecting the cottonseed meats to the extraction action of somewhat dilute ethyl alcohol of around 80% strength, until the bulk of the coloring matter is removed without removing any large fraction of the cottonseed oil.

Off. Gaz. 365, 570 (1927).

(733) U. S. 1,694,361, December 4, 1928, J. R. Sterling, Apparatus for the Extraction of Water, Oil, and Fatty Substances from Fish, Offal, Seeds, or Other Materials by Use of Solvents. - Apparatus for carrying out an extraction process of the type described comprising in combination a series of elongated extraction chambers each subdivided into substantially parallel compartments, a plurality of endless conveyors located respectively within the aforesaid extraction chambers and having the two runs of each conveyor arranged to traverse the two compartments aforesaid of each extraction chamber, means to supply the material to be treated to the first chamber of the series, means communicating between the chambers for the conveyance of the material from chamber to chamber throughout the series, means for supplying each chamber with a liquid-extracting medium, a plurality of heating jackets associated respectively with the several extraction chambers, means for conveying a gaseous heating medium through the jackets aforesaid, a preheater for the liquid extracting medium, and means for supplying the exhaust heating medium from the jackets aforesaid to said preheater.

Off. Gaz. 377, 233 (1928).

(734) U. S. 1,721,686, July 23, 1929, R. O. Boykin (to N. R. Vail), Recovering Oil from Cottonseed or Fish Meal or Other Oleaginous Meal. - The meal is freed from moisture sufficiently to render it substantially dry, agitated with C_6H_6 or other suitable water-insoluble oil solvent of a sp. gr. not higher than the sp. gr. of the meal, for at least a half hour, and the mixture is then distributed upon a supporting medium and the solution of solvent and oil is removed, the meal is washed with fresh solvent and this is separated and the oil recovered from the solvent. An apparatus is described.

C. A. 23, 4586 (1929).

(735) U. S. 1,748,356, February 25, 1930, E. Lawrence, Jr., Apparatus for Extracting Oils from Cotton Seed Meal or Other Materials by Use of a Solvent and Expression. - Structural features.

C. A. 24, 2001 (1930).

(736) U. S. 1,755,531, April 22, 1930, H. Beaufour, Casein from Vegetable Materials. - A raw material such as peanut-oil cake is treated with an alkali chloride such as NaCl, and the product thus formed is purified with lime, insoluble substances are separated, and the remaining liquor is coagulated by treatment with acid, e.g., HCl or HOAc at a pH of approximately 5.2. The product may be used in preparing adhesives, paints, etc.

C. A. 24, 2847 (1930).

(737) U. S. 1,775,154, September 9, 1930, R. O. Boykin (to N. R. Vail), Cottonseed Oil. - A continuous process of separating oil from raw comminuted cottonseed consists in adding an albumin-coagulating agent such as $Ca(OH)_2$ to the raw comminuted cottonseed to fix the albumin in the latter in insoluble nonadhesive granules, dissolving out the oil with C_6H_6, filtering the solution obtained, and separating the oil from the C_6H_6. Apparatus is described.

C. A. 24, 5175 (1930).

(738) U. S. 1,776,742, September 23, 1930, L. J. Simon and A. Simon (to Simon Bros. (Engineers), Ltd.), Apparatus for Extracting Oils, Fats, Waxes, etc., by Use of Solvent and Steam. - Structural features.

C. A. 24, 5523 (1930).

(738A) U. S. 1,791,906, February 10, 1931, J. Savage, Extracting Oleaginous Materials with Solvents such as in Degreasing Bones. - A volatile hydrocarbon solvent is circulated in a closed circuit through an extraction chamber, passing through the chamber as vapor, under superatmospheric pressure, the vapors are condensed, extracted water is automatically separated, and hot separated solvent is returned to the circuit at a temperature near the boiling point of the solvent at the pressure existing in the circuit. Apparatus is described.

C. A. 25, 2016 (1931).

(739) U. S. 1,794,105, February 24, 1931, L. F. David and G. Felizat, Obtaining Oil, Protein Material, Starch, and Cellulose from Seeds. - Seeds are crushed and the crushed mass is mixed with a slightly alkaline aqueous solution such as Na_2CO_3 to dissolve protein material, swell the cellulose, and suspend the starch and oils (the latter being in emulsion); the cellulose is separated by screening, the screened liquid is centrifuged at slow speed to separate suspended starch, and the liquid is then centrifuged at higher speed to break the emulsion and separate the oil; the liquid from the second centrifuging is treated with acid to precipitate protein material.

C. A. 25, 2318 (1931).

(740) U. S. 1,799,256, April 7, 1931, T. Satow, Apparatus for Removing Oil from Soybeans and for Semi-Baking the Beans. - In order to preserve the proteins in the cake, the (cracked) seed is dried by hot air until the H_2O content is reduced to 12.5-13% before extracting with light petroleum at not above 45° in a steam-heated rotary drum (details given). The solvent is removed from the extracted meal by hot dry air, the temperature being raised to 115-120°.

Br. A. B, 1060 (1931).

(741) U. S. 1,802,533, April 28, 1931, E. E. Reid (to Columbia Engineering and Management Corp.), Extracting Oil by Solvents from Seeds or Other Materials. - The material is treated with butane or other suitable hydrocarbon solvents gaseous at ordinary temperature and pressure, and the solvent is maintained in liquid phase while in contact with the material to be extracted; the solution is withdrawn and is heated to effect removal of the solvent. An arrangement of apparatus is described.

C. A. 25, 3862 (1931).

(742) U. S. 1,840,149, January 5, 1932, C. J. Bleil, Apparatus and System of Operation for Extracting Oils from Materials Such as Seeds, etc., by Use of Solvents. - The oil-bearing materials are agitated with a solvent, e.g., C_6H_6, and filtered through a filter consisting of an endless chain of compartments moving over two sprocket wheels. Below the upper horizontal travel of the compartments is a vacuum chamber into which the filtrate is sucked, whilst above the lower horizontal travel is a pressure chamber from which vapors and some of the recovered solvent force the residue from the compartments, the solvent containing the finer particles being pumped to the top travel. The residue is dried in a steam-heated chamber and the solvent removed from the filtrate by distillation. All vapors are vented to oil scrubbers.

Br. A. B, 996 (1932).

(743) U. S. 1,849,886, March 15, 1932, H. Rosenthal (to Columbia Engineering and Management Corp.), Extracting Oils from Materials by Use of Solvents. - The material is subjected to a reduced pressure and then treated with a solvent such as C_4H_{10} which is gaseous at ordinary atmospheric temperature and pressure, and the solvent is maintained in liquid phase while in contact with the material to be extracted; the solution formed is withdrawn, the solvent is vaporized at a temperature above the temperature of the extraction and by use of a partial vacuum, and the solvent vapors are condensed and returned for further use in the extraction. Apparatus is described.

C. A. 26, 2802 (1932).

(744) U. S. 1,850,095, March 22, 1932, F. P. Dengler (to L. M. Brown), Extracting Oil from Vegetable Material Such as Soybeans or Other Seeds. - The material is treated, at a temperature not above about 82°, with a dilute aqueous NH_3 solution, the solution formed is drained from the material and the latter is then subjected to the action of an organic fat solvent such as CCl_4 or benzene to dissolve the oil.

C. A. 26, 2883 (1932).

(745) U. S. 1,860,388, May 31, 1932, P. R. Hornbrook, Extraction of Oil. - Comminuted seed, etc., is fed continuously through an annular space surrounding a rotating perforated drum (covered with filter-cloth) the diameter of which is increased stepwise in order progressively to reduce the thickness of the material and increase the surface exposed to the solvent, which is introduced on the countercurrent principle. In the last stage the thinnest ring of extracted meal is treated with steam in order to remove the solvent and dry the material.

Br. A. B, 435 (1933).

(746) U. S. 1,862,945, June 14, 1932, C. Schlotterhose, Extracting Oils and Fats. - In extraction with a solvent, the material to be treated and the

solvent are conveyed counter-currentwise through a plurality of extractors so that the material is moved upwardly in each extractor and alternately dipped in extracting liquid and trickled with the liquid. Various details of apparatus and operation are described.

C. A. 26, 4194 (1932).

(747) U. S. 1,864,237, June 12, 1932, P. L. Fauth, Apparatus for Extraction and Filtration of Material Such as Oil Mixed with Fuller's Earth. - Structural features.

C. A. 36, 4494 (1932).

(748) U. S. 1,865,615, July 5, 1932, E. D. Coleman, Extracting Oil from Seeds or Other Materials by Use of Volatile Solvents. - Apparatus and various details of operation are described.

C. A. 26, 4494 (1932).

(749) U. S. 1,892,366, December 27, 1932, M. Sato and C. Ito (to Minami Manshu Tetsude K. K.), Extracting Fatty Oil from Soybeans. - Alcohol is added as a solvent to the beans and the mixture is heated under pressure to above the boiling point of the alcohol under ordinary atmospheric pressure but below 120° to extract oil, and the oil is separated from the extracted liquor by cooling below 50°.

C. A. 27, 2056 (1933).

(750) U. S. 1,917,734, July 11, 1933, B. Rewald, Extraction of Oil and Lecithin from Seeds Such as Soybean, Cottonseed, or Peanuts. - The comminuted seed material is treated with a composite solvent containing an aromatic hydrocarbon such as C_6H_6 together with 1-10% of a lower alcohol such as MeOH or EtOH, and the seed material is subsequently dried in a current of gas such as air at not above 70°. The dried product can be used in cattle feed.

C. A. 27, 4706 (1933).

(751) U. S. 1,920,499, August 1, 1933, W. E. Flummerfelt, Apparatus for Countercurrent Solvent Extractions Such as Fat and Oil Extractions. - Various structural, mechanical, and operative details are described.

C. A. 27, 4721 (1933).

(752) U. S. 1,937,694, December 5, 1934, P. A. Goldfisch, Apparatus Suitable for Extraction of Fatty Content of Materials by Use of a Solvent. - Structural details.

C. A. 28, 940 (1934).

(753) U. S. 1,940,585, December 19, 1934, P. L. Fauth, Continuous Extraction and Filtration Apparatus Suitable for Extracting Oils from Seeds. - Various structural and operative details of a rotary-drum apparatus are described.

C. A. 28, 1562 (1934).

(754) U. S. 1,961,420, June 5, 1934, K. Hildebrandt, Apparatus (with Screw Conveyors) for Continuous Extraction of Oils and Fats. - Structural and operative details. U-shaped apparatus.

C. A. 28, 4928 (1934).

(755) U. S. 2,018,781, October 29, 1935, A. Gehrke, Lecithin and Oil Mixtures from Fresh Soybean Sludge. - A storable mixture is obtained by treating soybean sludge with glycerol and then separating undissolved solids from the aqueous glycerol mixture. The product is suitable for use in foods, etc.
O. & S. 13, 50 (1936).

(756) U. S. 2,056,735, October 6, 1936, A. Olier (to Soc. Anon. de Etablissements A. Olier), Apparatus for Countercurrent Extraction of Beet Slices, Oleaginous Materials, etc. - Various structural and operative details.
C. A. 30, 8676 (1936).

(757) U. S. 2,067,415, January 12, 1937, C. S. Robison (to Oliver United Filters, Inc.), Vacuum Extractor and Rotary-Drum Filter Apparatus Suitable for Continuous Operation. - Various structural and operative features.
C. A. 31, 1258 (1937).

(758) U. S. 2,074,988, March 23, 1937, W. J. O'Brien and R. C. Brett (to Glidden Co.), Apparatus for Extractions with Solvents, as in Extracting Oil from Oil-Bearing Seeds. - Various structural and operative features.
C. A. 31, 3316 (1937).

(759) U. S. 2,078,841, April 27, 1937, P. L. Fauth (to Ges. zur Verwertung Fauth'scher Patente m. b. h.), Apparatus for the Continuous Distillation of Mixtures of Oils or Fats and Solvents. - Claim 1. Apparatus for the continuous distillation of mixtures of fats and solvents and for deodorizing the resultant oil or fat in a continuous operation, comprising a series of deodorizing chambers, a series of distilling chambers, and gaseous fluid conveying means connecting the various types of chambers.
Off. Gaz. 477, 956 (1937).

(760) U. S. 2,086,180, July 6, 1937, M. Bonotto (to American Soya Products Corp.), Removing Solvent from Solvent-Treated Material Such as Soybean Residue after Extraction with Gasoline. - Steam is injected into superposed zones of the material, the steam injections for the several zones commencing at successive intervals of time, the rate per pound per hour of steam injection being increased for each zone, and the steam injection being continued in each of the zones until all have been steam treated, and solvent being carried off in admixture with the steam. Apparatus is described.
C. A. 31, 5908 (1937).

(761) U. S. 2,086,181, July 6, 1937, M. Bonotto (to American Soya Products Corp.), Apparatus for Continuous Treatment of Soybeans with Sulfur Dioxide Solution, etc. - Various structural and operative details of an apparatus suitable for removing the acrid taste and odor from soybeans by soaking in an SO_2 solution and then washing (a soaking for 8 hours and washing countercurrentwise in fresh water for 10 hours being a suitable duration of treatment).
C. A. 31, 5896 (1937).

(762) U. S. 2,096,188, October 26, 1938, H. H. Bighouse (to C. O. Bartlett & Snow Co.), Apparatus (With Vertical Shells and Spiral Screw Conveyors)

for Extracting Oils from Materials Such as Crushed Seeds and Beans. - Various structural and operative details.

C. A. 32, 382 (1938).

(763) U. S. 2,096,728, October 26, 1937, H. H. Bighouse (to C. O. Bartlett and Snow Co.), Apparatus for Extracting Oils from Oleaginous Materials. - Continuous solvent extraction apparatus built on the counterflow principle.

O. & S. 15, 91 (1938).

(764) U. S. 2,097,147, October 26, 1937, C. R. Dinley (to J. H. Bell), Extracting Oils and Fats from Materials Such as Soybeans, etc. - An arrangement of apparatus is described, and a process of extracting native oil or fat from moisture and oil or fat-containing animal or vegetable cellular and (or) fibrous material with hot volatile organic chlorinated grease solvents that decompose with generation of chlorine acid when they are exposed in the hot vapor state to the atmosphere or to moisture, and of preventing decomposition of the solvent due to such exposure even when the material treated contains moisture, as well as deterioration of the matter treated resulting from decomposition of the solvent; which process comprises heating and volatilizing along with the organic chlorinated solvent, an organic stabilizer that is compatible and unreactive with the material treated and is soluble in and compatible with the moist chlorinated solvent, volatilizing with the solvent without being decomposed by heat but not boiling off from it below the boiling point of the chlorinated solvent; and treating the material with the solvent, thus stabilized, while maintaining admixture of volatilized organic stabilizer with the chlorinated solvent vapor during the exposure of the solvent to the atmosphere or to moisture.

C. A. 32, 382 (1938).

(765) U. S. 2,112,805, March 29, 1938, M. Bonotto (to Extractol Process, Ltd.), Extracting Fats and Oils by Use of Solvents. - An apparatus is described and a process for the extraction of oils, fats, and other soluble constituents from materials such as nuts, seeds, or meat scrap by use of solvents comprising the continuous feeding, through a plurality of diffusion zones of an extraction unit, of a solid oil-bearing material from a position and in a direction in which such material will be nonmechanically moved by potential energy from one end of the plurality of zones to the other, and will provide in the zones a given pressure, the continuous feeding through the plurality of zones of a solvent liquid in counterpressure to the pressure of the material and in a direction opposite to the movement of the material, independently circulating the liquid in each of the plurality of zones by heat, the discharging of solvent and oil at the end of the plurality of zones first mentioned, and the discharging of solid material at the opposite end.

C. A. 32, 3995 (1938).

(766) U. S. 2,117,113, May 10, 1938, P. J. W. Engler (to Hansa-Mühle A.-G.), Apparatus for Continuous Extraction of Material such as Oil-Bearing Seeds on the Paternoster Principle. - Various structural and operative details.

C. A. 32, 5242 (1938).

(767) U. S. 2,119,872, June 7, 1938, G. Wiegand (to Chemische Fabrik, Grünau, Landshoff & Meyer, A.-G.), High-Molecular Substituted Protein-Cleavage Products (Wetting, Leveling, Fiber Protective, and Emulsifying Agents for

Use in Dyeing and Other Processes). - Protein cleavage products of high molecular weight substituted at the nitrogen by an alkyl radical which in turn is substituted by an aromatic radical are produced by treating protein materials such as that from leather waste, alkali-degraded wheat gluten products, or the like with an alkyl halide substituted by an aromatic radical, such as benzyl chloride, in the presence of an acid-binding substance such as a soda solution. Numerous examples with details are given.
C. A. 32, 5964 (1938).

(768) U. S. 2,123,212, July 12, 1938, H. Scholler, Process of Extraction. - An intermittent type of extractor, which in principle comprises passing individual batches of solvent through vegetable material, was described.
O. & S. 16, 76 (1939).

(769) U. S. 2,135,462, November 1, 1938, E. J. Boroughs (to Commercial Solvents Corp.), Process for Recovering Maize Oil. - This patent relates to the recovery of maize oil. Grain meal is subjected to a treatment which converts the starch into water-soluble products without substantially affecting the maize germ. The germs are separated for solvent extraction.
O. & S. 16, 76 (1939).

(770) U. S. 2,150,608, March 14, 1939, A. Olier (to Soc. Anon. Etab. A. Olier), A Column Suitable for the Continuous Extraction of Ground Seeds or Oil-Cake, etc., with Solvents. - Various structural, mechanical, and operative details.
C. A. 33, 4808 (1939).

(771) U. S. 2,152,664-5-6-7, April 4, 1939, H. Rosenthal, Use of Solvents for Extracting Oils and Fats from Various Animal and Vegetable Materials. - Various details of apparatus arrangement and operation for the use of solvents in the extraction of oils and separation of their constituents, as by the use of hydrocarbon solvents such as butane and propane.
C. A. 33, 5817 (1939).

(772) U. S. 2,154,339, April 11, 1939, E. Lawrence, Apparatus for Extracting Oils from Materials such as Soybean or Cotton Seed by Use of Solvents. - Various details of an apparatus having an upright extractor chamber larger at the bottom than at the top and having a screw in its lower portion to force material through a discharge opening.
C. A. 33, 5692 (1939).

(773) U. S. 2,154,713, April 18, 1939, W. R. Van Wijk and W. J. D. van Dijck (to Shell Development Co.), Extracting Ethereal Oils. - Apparatus is described, and a process for separating ethereal oil containing constituents of different dipole moments into fractions containing concentrates of different constituents by means of solvents, comprising subjecting an oil such as lemon oil to the extracting action of a liquid polar preferential solvent for a nonhydrocarbon ethereal constituent of the oil having a relatively high dipole moment, such as 90% aqueous MeOH, and a nonpolar solvent in the liquid state such as C_5H_{12}, the solvents used being at least partially immiscible under the extracting conditions in the presence of the oil, and the extracting conditions being such as to cause the formation of a liquid phase rich in the polar solvent containing a concentrate of the

nonhydrocarbon constituent and a liquid phase rich in the nonpolar solvent containing a concentrate of a constituent having a lower dipole moment, these liquid phases being separated from each other.

C. A. 33, 5597 (1939).

(774) U. S. 2,156,236, April 25, 1939, M. Bonotto (to Extractol Process, Ltd.), Extracting Oils, Fats, etc., from Various Materials. - Apparatus is described, and a process for extraction of oils, fats, and other soluble constituents from materials, consisting in substantially filling an extraction unit with a quantity of solid oil-bearing material, retarding the potential movement of the quantity of material, and dividing the same by dividing elements into a plurality of blocks, providing the divided blocks with intercommunicating openings at positions out of registration with each other, continuously discharging solid material at one end of the unit to cause vertical movement by potential energy of the material in the blocks through the communicating openings from one block to another thereof, feeding a quantity of material at the opposite end thereof, moving the dividing elements and the positions of the intercommunicating openings with respect to the blocks of materials, passing liquid solvent in countercurrent with the vertical movement of the solid material through the unit, rotating the vertically-moving stream of solvent in relation to the mass of material.

C. A. 33, 6078 (1939).

(775) U. S. 2,158,427, May 16, 1939, J. Reichert, Continuous Extraction of Earth Nuts or Other Oil Seeds with Solvents. - Apparatus is described, and a process in which oil seeds are comminuted in their passage through an extraction plant in a solvent, in a series of separate steps in which they are ground to a successively increasing fineness, while passing countercurrent to the flow of the solvent, with pressing of the seeds between the successive comminuting steps.

C. A. 33, 7138 (1939).

(776) U. S. 2,163,303, June 20, 1939, M. Bonotto (to Extractol Process, Ltd.), Separating Solvents from Oil in "Miscella". - Immersed within the miscella is a bank of tubs surrounded by steam chambers. Jets of steam with entrained miscella are blown through, and into contact with, the tubes to procure a rapid circulation of the miscella and to avoid condensation of the blown steam within the mass of miscella. Simultaneously and in the same operation the jets of steam are used to atomize the miscella and entrain and drive off the last traces of solvent, and the atomized miscella and steam are condensed and separated into water and solvent.

C. A. 33, 7627 (1939).

(777) U. S. 2,174,438, September 26, 1939, J. F. Corwin and H. V. Dunham, Adhesives and Sizings from Seed Meals such as Peanut or Soybean Meal. - A readily dispersible adhesive base is prepared by dissolving matter from a seed meal in an alkaline solution such as one of NH_3 or borax, separating insoluble matter from the solution, and evaporating the solution to substantial dryness.

C. A. 34, 834 (1940).

(778) U. S. 2,183,837, December 19, 1939, A. G. Hamilton and E. C. Perkins (to E. I. du Pont de Nemours & Co.), Extraction of Oils such as Soybean,

Castor, Whale, Codliver, and Halibut Oils. - Apparatus is described, and a continuous process for extracting extractable material from solids wherein a solvent for the extractable material flows countercurrent to the direction of travel of the solids through the solvent, which comprises continuously passing the solid through a countercurrent stream of the solvent under conditions wherein extraction is carried out under pulsating pressures.

C. A. 34, 2628 (1940).

(779) U. S. 2,184,248, December 19, 1939, M. Bonotto (to Extractol Process, Ltd.), Apparatus for Use of Solvents in Extracting Oils, Fats, and Other Soluble Constituents from Solid Materials. - Various structural and operative details.

C. A. 34, 2627 (1940).

(780) U. S. 2,186,066, January 9, 1940, H. Ford and R. A. Boyer (to Ford Motor Co.), Apparatus for Crushing Soybeans in Preparation for Oil Extraction. - Various structural, mechanical, and operative details.

C. A. 34, 3120 (1940).

(781) U. S. 2,187,890, January 23, 1940, E. C. Pattee (to National Distillers Products Corp.), Apparatus Suitable for Solvent Extractions of Rice Bran, Oleaginous Seed Materials, Distillers' Grains, Caliche, Wood Chips, etc. - An apparatus for continuous extraction comprises an extracting vessel for commingling an extracting solvent and material to be extracted, the vessel having inlets for the solvent and the material and having a discharge outlet at its lower portion, an expressing chamber above the extracting vessel, a vertically-extending housing encircling the extracting vessel and the expressing chamber connecting with the discharge outlet in the extracting vessel, an opening in the housing above and connecting with the expressing chamber, an endless conveyor within the housing for raising the material from the discharge outlet to the expressing chamber, a conduit leading from the expressing chamber to the housing on the side on which the endless conveyor descends, and an outlet from the expressing chamber for carrying off the extracted material.

C. A. 34, 3547 (1940).

(782) U. S. 2,188,673, January 30, 1940, M. Bonotto (to Extractol Process, Ltd.), Filter Suitable for Use with "Miscella" Containing Oil, Solvent, and Solid Particles. - Various details of a continuous filter in which a circulative filtering material such as the material extracted or to be extracted is employed as a filtering medium.

C. A. 34, 3545 (1940).

(783) U. S. 2,189,481, February 6, 1940, D. Traill (to Imperial Chemical Industries, Ltd.), Artificial Filaments, etc., from Proteins such as Peanut Protein. - By hardening the coagulated material, as by CH_2O and use of HCl, etc., it is given a water-repellent character, a soft handle, and sufficient resistance to deterioration by hot dilute aqueous acid solutions for withstanding acid wool dyeing baths.

C. A. 34, 4285 (1940).

(784) U. S. 2,191,255, February 20, 1940, M. Bonotto (to Extractol Process, Ltd.), Extraction of Oils and Fats from Seeds, Bone Meal, Meat Scraps, etc.

- An arrangement of apparatus is described, and a continuous extraction system which involves continuously removing from solvent-treated materials, solvent of lower sp. gr. than such materials, comprising the continuous conveyance, in an upward direction, through a plurality of superposed steam-injection zones, of material containing traces of solvent, the subjection of the material in such zones during movement thereof to the solvent-entraining action of jets of steam, the steam jets being heated progressively and increased to higher temperature for each successive zone above the preceding zone, beginning at the lowermost zone and rising upwardly, whereby successive particles of solvent are entrained at successively higher zones, the continuous carrying off of steam and entrained solvent above the discharged material.

C. A. 34, 4601 (1940).

(785) U. S. 2,191,455, February 27, 1940, A. L. Davis and L. H. Bartlett, Extracting Oils or Fats from Cottonseed or other Non-Mineral Materials. - A process of extracting a fat or oil from an oleaginous material of non-mineral origin containing coloring matter soluble in the fat or oil comprises subjecting the material to the action of a liquid solvent mixture consisting of a liquid saturated hydrocarbon having 3 to 4 C atoms and a small proportion of dimethyl ether, methyl-ethyl ether, or diethyl ether adapted to produce an extract containing the fat or oil wherein the quantity of coloring matter in the fat or oil is substantially less and the character of the coloring matter is substantially more susceptible to removal in subsequent refining than in a fat or oil resulting from subjecting the material to the action of the saturated hydrocarbon alone; separating the extract from the residue; and separating the solvent from the extract.

C. A. 34, 4602 (1940).

(786) U. S. 2,192,194, March 5, 1940, T. Kazita and R. Inoue (to Syowa Sangyo K. K.), Artificial Fiber from Soybean Protein. - A process is employed which involves extracting the protein with dilute alkaline solution from the residue of the soybean from which the oil content has been extracted, precipitating the protein by adding a substance selected from acids or the metal salts thereof to the solution, washing the precipitate with water, adding lecithin while the precipitate is wet, dissolving the mixture in an alkaline solution, permitting the resulting solution to mature, and spinning the solution thus obtained into an acid bath.

C. A. 34, 4589 (1940).

(787) U. S. 2,198,412-3, April 23, 1940, D. McDonald (to Engineering Inc.), Removal and Recovery of Solvent. - Apparatus is described.

O. & S. 17, 135 (1940).

(788) U. S. 2,198,538, April 23, 1940, T. Kazita and R. Inoue (to Syowa Sangyo K. K.), Artificial Fiber from Soybean Protein. - A process of manufacturing artificial fiber from protein contained in the soybean involves extracting the protein with dilute alkaline solution from the residue of the soybean from which the oil content has been extracted, precipitating the protein by adding an acid to the solution, washing the precipitate with water, adding sugar while the precipitate is wet, dissolving the mixture in an alkaline solution, permitting the resulting solution to mature, and spinning the solution thus obtained into an acid bath.

C. A. 34, 6097 (1940).

(789) U. S. 2,199,670, May 7, 1940, T. K. Lowry (to Darling and Company), Apparatus for Rendering and Extraction. - An apparatus for removing fats and glue from materials such as bones, hide trimmings, fish, extracting oil from oil-bearing seeds, etc., includes a hollow chamber, a substantially central passage therein, a plurality of passages surrounding said central passage in a peripherally extending row, means for positively forcing and circulating material through the central passage in one direction by mechanical forcing means, and forcing it through the other passages to a position where the same is again picked up and again circulated through the central passage.

C. A. 34, 61153 (1940).

(790) U. S. 2,200,202, May 7, 1940, C. E. Harvey, Centrifugal Machine for Separation of Solids and Liquids. - Various structural and operative details of an apparatus suitable for treating sewage or separating coal dust, crushed grain, etc., from liquids such as water.

C. A. 34, 5705 (1940).

(791) U. S. 2,200,390, May 14, 1940, S. E. Freeman (to Pittsburgh Plate Glass Co.), Extracting and Refining Glyceride Oils. - A method of separating glyceride oils of a class consisting of linseed, soybean, fish, perilla, and cottonseed oil from materials containing them comprises extracting the material with furfural or furfuryl alcohol at a temperature not substantially below 104°F. to obtain a solution of oil in the compound, then cooling the solution to effect separation of lightly-saturated glycerides as a liquid phase, separating the two liquid phases, and removing the furan compound therefrom.

C. A. 34, 6116 (1940).

(792) U. S. 2,200,391, May 14, 1940, S. E. Freeman (to Pittsburgh Plate Glass Co.), Solvent Extraction of Glyceride Oils. - A process of selectively separating a fraction which is rich in unsaturated glycerides from a material containing such glycerides in admixture with a more completely saturated glyceride, such as linseed oil, etc., involves the use of an organic solvent which at low temperature is relatively immiscible with the saturated glyceride, the temperature of treatment being above about minus 20°C., the ratio of solvent and the temperature being below that of complete miscibility with the glycerides, separating the two phases while they are both in liquid state, one containing primarily undissolved glycerides relatively poor in unsaturated glycerides and containing some solvent, and the other consisting of solvent in which are dissolved glycerides relatively rich in unsaturates.

C. A. 34, 6115 (1940).

(793) U. S. 2,200,983, May 14, 1940, C. F. Dinley (to Solvent Machine Co., as trustee), Extraction of Soybeans or Other Materials with Solvents. - A continuous process for the extraction treatment of organic material containing oil, fat, or resin and the removal of residual solvent from the treated material comprises continously and successively feeding the organic material into, through, and out of closed treating and solvent removal chambers, and providing liquid solvent in the treating chambers for the treatment of the material; in the treating chamber continually heating and vaporizing the liquid solvent and condensing the vapor, and percolating the condensate across and through the traveling material in the chamber; in the solvent removal chamber continually heating the traveling material and thereby

vaporizing out the solvent remaining therein, while leaving a region of the chamber substantially unheated; continually condensing the solvent vapor in the unheated region; and withdrawing liquid solvent containing extracted matter from both of the chambers, purifying it of such extracted matter, and returning the purified solvent to the treating chamber.

C. A. 34, 6470 (1940).

(794) U. S. 2,205,284, June 18, 1940, W. R. Eckart (to C. F. Braun & Co.), Bubble-Column for Various Fractionation, Absorption, or Extraction Treatments, etc. - Various structural details.

C. A. 34, 6859 (1940).

(795) U. S. 2,206,595, July 2, 1940, M. Bonotto (to Extractol Process, Ltd.), Method and Apparatus for Continuous Countercurrent Solvent Extraction of Solid Materials. - Apparatus for solvent extraction of oils contains a series of screw conveyors.

Off. Gaz. 516, 185 (1940).

(796) U. S. 2,218,080, October 15, 1940, G. Bottaro, Apparatus for Continuous Countercurrent Extractions, etc. - Various structural and operative details of an apparatus, with an inclined horizontal rotary extraction cylinder with internal stirrer arms, suitable for extracting oils from seeds, bringing oil into contact with a bleaching earth or with H_2SO_4 or with a selective solvent, etc.

C. A. 35, 936 (1941).

(797) U. S. 2,223,747, December 3, 1940, H. Suss (to Maschinen und Metallwaren-Handels Ges. m. b. H.), Apparatus for Continuous Extraction of Oil from Seeds, etc., by Use of Solvents. - Apparatus is used comprising a vertical tube open at both ends and adapted for the reception of the material to be subjected to extraction, a vessel surrounding the tube and adapted for the reception of the solvent, means for periodically moving the tube upward and downward within the vessel, and means for discharging the material subsequent to its passage through the solvent from the upper end of the vessel.

C. A. 35, 2024 (1941).

(798) U. S. 2,225,799, December 24, 1940, H. S. Robinson (to French Oil Mill Machinery Co.), Apparatus (of the Paternoster Type) Suitable for Extraction of Oils and Fats from Vegetable Seeds, etc., by Use of Solvents. - Various structural, mechanical, and operative details.

C. A. 35, 2352 (1941).

(799) U. S. 2,227,605, January 7, 1941, L. C. Swallen and H. Reintjes (to Corn Products Refining Co.), Apparatus Suitable for Use in Extracting Zein from Gluten Meal with an Alcoholic Solvent, etc. - Various structural, mechanical, and operative details.

C. A. 35, 2645 (1941).

(800) U. S. 2,230,624, February 4, 1941, A. McLean (to Imperial Chemical Industries, Ltd.), Extraction of Protein Material from Peanuts. - Claim 1. In the extraction from peanuts of light-colored globulins particularly

adapted for use in making artificial fibers, the process which comprises agitating an aqueous suspension of finely divided oil-freed peanut residues in the presence of an alkaline material of such strength and in such dilution that the hydrogen ion exponent or pH value of the mixture in the latter stages of extraction is between 8 and 8.5 and does not exceed 8.5 at any time, separating insoluble matter from the aqueous phase, and recovering the protein contained in said aqueous phase.

Off. Gaz. 523, 143 (1941).

(801) U. S. 2,254,245, September 2, 1941, H. Rosenthal, Method and Product of Cottonseed Extraction. - Rosenthal selectively extracted a "winterized" grade of cottonseed oil by extraction at -20° with normally gaseous hydrocarbons. O. & S. 19, 47 (1942).

(802) U. S. 2,254,867, September 2, 1941, M. Bonotto (to Extractol Process, Ltd.), Continuous Countercurrent Extraction System. - Claim 1. The process for the continuous treatment of exhausted solvent-impregnated solid agglutinative organic materials.

Off. Gaz. 530, 201 (1941).

(803) U. S. 2,264,390, December 2, 1942, A. A. Levine, O. R. Sweeney, C. E. Kircher, and W. L. McCracken (to E. I. du Pont de Nemours & Co.), Apparatus for Continuous Countercurrent Extractions, as in Extracting Oil from Soybeans with Trichloroethylene or the Like. - Various structural, mechanical, and operative details. C. A. 36, 1531 (1942).

(804) U. S. 2,273,557, February 17, 1942, M. Bonotto, Solvent Extraction Process and Apparatus. - This improvement on a continuous extraction system involves mechanical details for countercurrently-flowing raw material and solvent.

O. & S. 20, 39 (1943).

(805) U. S. 2,276,298, March 17, 1942, C. H. Frazier (to The Drackett Co.), Solid and Liquid Contact Apparatus, Suitable for Use of Solvents in Extracting Oils from Seeds, etc. - Various structural and operative details, for continuous extraction by counterflow operation.

C. A. 36, 4376 (1942).

(806) U. S. 2,277,342, March 24, 1942, R. S. McKinney, W. G. Rose, and A. F. Freeman, Process for the Preparation of Tung Oil. - Petroleum ether solvent-extracted tung oil can be clarified by heating at 200° for 30 minutes.

O. & S. 20, 40 (1943).

(807) U. S. 2,277,401, March 24, 1942, K. C. D. Hickman, Solvent Recovery. - Hickman recovered solvent by vaporizing and then absorbing vapors in a new charge.

O. & S. 20, 39 (1943).

(808) U. S. 2,278,647, April 7, 1942, J. F. Cyphers, G. Scheu, and J. Scheu (to Wallace T. Rockwood and Co.), Continuous Solvent Extraction Appara-

tus Suitable for Treatment of "Press-Cake" from Cacao Beans. - A closed system is used for extracting fatty material from solids with a volatile solvent and recovering and reusing the solvent comprising means for injecting steam into the system to vaporize solvent to be recovered, means for collecting and condensing the solvent vapors and steam, means for separating the liquids thus condensed, and means for treating the separated water in a lower portion thereof, means for heating and circulating the water in the container, and means for discharging from the system water overflowing from the container. *C. A.* *36*, 5042 (1942).

(809) U. S. 2,290,209, July 21, 1942, H. Rosenthal, *Apparatus Suitable for Distilling Propane from Oil After Extraction from Cottonseeds.* - For various distillations, use is made of a closed still, suitable for the continuous separation of a solvent from a solution, comprising a vertical closed cylindrical vessel adapted for pressure and containing alternately a plurality of distributor trays and heating trays, each distributor tray being a plate adapted to discharge solution around its periphery to the heating tray below, each heating tray being two dished heads joined together in a manner to form a closed interior space between the heads for the circulation of heating medium, means for conducting solution to the still, means for withdrawing solvent vapors and liquid solute from the still, and means for conducting heating medium such as steam to and from the heating trays.
C. A. *37*, 548 (1943).

(810) U. S. 2,291,701, Aug. 4, 1942, H. Dreyfus (to Celanese Corp. of America), *Production and Treatment of Artificial Filaments of Material Such as Peanut Protein or Casein.* - The resilience of artificial filaments of proteineous material is increased by heating them with elementary S, Se, or Te to effect reaction between the protein and the S, etc.
C. A. *37*, 780 (1943).

(811) U. S. 2,297,397, Sept. 29, 1942, F. Antonio (to Alien Property Custodian), *Insolubilizing Protein Fibers During Their Manufacture, as from Alkaline Casein Solutions.* - Freshly spun filaments are subjected, after multiple spinning and acid coagulation, to treatment in an aqueous insolubilizing bath containing a soluble Cr compound such as the sulfate, chloride, or alum in the presence of NaCl which serves to restrain swelling of the filaments during insolubilizing.
C. A. *37*, 1611 (1943).

(812) U. S. 2,298,127, Oct. 6, 1942, O. Huppert (to Glidden Co.), *Artificial Fiber from Soybean-Protein Material.* - A process is employed which involves spinning into a coagulating bath, such as a solution of H_2SO_4 and Na sulfate, a solution containing soybean-protein disulfide prepared by treating soybean-protein hydrolyzate with CS_2 at a hydroxyl-ion concentration which at most corresponds to that of a solution of $Ca(OH)_2$ and oxidizing the sulfurized protein to produce the disulfide, hardening the fibers, as by a solution containing formaldehyde and NaCl, and subjecting the hardened fibers to the action of nitrous acid before washing, and then washing.
C. A. *37*, 1611 (1943).

(813) U. S. 2,306,655, Dec. 29, 1942, H. Truax, *Soybean Flaking Machine.* - This invention is a new soybean flaking machine, on improvement in solvent

extraction equipment. O. & S. 20, 39 (1943).

(814) U. S. 2,310,221, Feb. 9, 1943, R. O. Denyes (to Tubize Chatillon Corp.), Artificial Filaments of Glycinin Derivatives. - Glycinin is dispersed in an alkaline solution such as one of NaOH in the presence of a hydroxyalkyl sulfoxylate such as Na and Zn formaldehyde sulfoxylates, and the resulting dispersion is spun into an acidic spinning bath, such as a 1-3% H_2SO_4 solution also containing Na_2SO_4 and glucose, and the resulting filaments of precipitated glycinin alkyl sulfoxylate are collected.
C. A. 37, 4259 (1943).

(815) U. S. 2,316,512, Apr. 13, 1943, S. E. Freeman (to Pittsburgh Plate Glass Co.), Liquid-Phase Extraction of Glyceride Oils and Acids. - A process is employed for selectively extracting a fraction rich in unsaturated glycerides from a material, such as linseed oil, soybean oil, cottonseed oil, or fish oils, containing such glycerides in admixture with more completely saturated glycerides, which involves bringing the material into contact with an organic polar solvent in which the polar group is a nitro group, such as nitromethane, nitroethane, nitrobenzaldehyde, or ortho-nitrianisole, the solvent used being, at a low temperature, relatively immiscible with the saturated glycerides but being completely miscible at elevated temperatures, the temperature of treatment being above about -20° C., the ratio of solvent and the temperature being below that of complete miscibility with the glycerides; and separating the two resultant phases while they are both in liquid state. Numerous solvents are listed which may be used.
C. A. 37, 5882 (1943).

(815A) U. S. 2,320,738, June 1, 1943, J. D. Jenkins (to Pittsburgh Plate Glass Co.), Fractionation of Soybean, Cottonseed, Linseed, or Coconut Oil or Other Fatty Oils and Free Acids Derived from Them. - A process is employed for separating into fractions a glyceridic oil or free fat acid material derived from such an oil. It comprises components, one of which is of relatively high polar moment and another of which is of relatively low polar moment. The process involves bringing the material into contact with a nonreactive solvent mixture containing a selective polar solvent and a substantial amount of water dissolved therein at a temperature below that of complete miscibility of the material with the wet solvent, but substantially above that of freezing of the material, to dissolve a substantial amount of the first-mentioned component and to leave a substantial amount of the second-mentioned component undissolved, then separating the two liquid phases from each other, and removing the solvent and water from them to obtain the desired fractions. The solvent mixture used may contain acetone, furfural, or various other listed compounds.
C. A. 37, 6921 (1943).

(816) U. S. 2,321,923, June 15, 1943, A. A. Levine and R. J. Dent (to E. I. du Pont de Nemours & Co.), Countercurrent Extraction Apparatus Suitable for Extractions such as that of Oleaginous Matter from Flaked or Comminuted Soybeans with Trichloroethylene or the Like. - An apparatus is used for extraction of solid particles having a sp. gr. less than the solvent employed, comprising an inclined tube leading from and to a filtering chamber interposed in the upper end thereof, a conveyor in this tube extending through the chamber and arranged to convey the solid particles downwardly through the tube against upwardly-flowing solvent, a filtering screen arranged in

the chamber to form a continuation of the bottom portion of said tube, a solvent outlet conduit from the chamber below the screen, the conduit and chamber being so arranged and constructed as to provide a solvent trap, whereby the solvent level in the chamber is maintained above the filtering area of the screen.

C. A. 37, 6502 (1943).

(817) U. S. 2,325,327, July 27, 1943, F. B. Lachle (to The Schwarz Engineering Co.), Extraction of Oil from Materials such as Olives, Castor Beans, Sardines, Corn Germs, Wheat Germs, Cottonseed, and Peanuts. - The initial material is reduced to substantially cellular form in an aqueous medium, as by the action of a ball mill, and oil is liberated from the individual cells by subjecting the material to the action of cascading pressure elements such as those of ball mills, and separated, as by centrifugal action.

C. A. 38, 504 (1944).

(818) U. S. 2,325,328, July 27, 1943, F. B. Lachle (to The Schwarz Engineering Co.), Extraction of Oil from Materials such as Olives, Castor Beans, Sardines, Corn Germs, Wheat Germs, Cottonseed, and Peanuts. - This patent relates to oil extraction from starch-containing materials by a process in which treatment with steam and an acid or enzymatic material for starch conversion may be employed.

C. A. 38, 504 (1944).

(819) U. S. 2,331,785, Oct. 12, 1943, F. B. Lachle, Oil Extraction. - Lachle designed oil extraction processes for cellular oil-bearing materials having gelatinous constituents. Some of the interesting steps in the processes were removal of starch, protein, or other gelatinous materials by liquefaction with enzymes or solution in water, the use of ball mills for liberating the oils from cells, and the use of centrifuges for liquid concentration and separation.

O. & S. 21, 66 (1944).

(820) U. S. 2,334,015, Nov. 9, 1943, A. A. Levine, O. R. Sweeney, C. E. Kircher, Jr., and W. L. McCracken, Continuous Solvent Recovery Apparatus. - An invention related to the solvent extraction process: an apparatus for removing solvent from extracted residue.

O. & S. 22, 71 (1945).

(821) U. S. 2,337,034, Dec. 21, 1943, A. L. Davis, Heat-Treatment of Cottonseed or Other Animal or Vegetable Materials, as for Foods or Oil Extraction. - In the rapid heat-treatment of material for use as foods or for the subsequent separation of constituents (such as hulled and rolled cottonseed for subsequent oil extraction) a process is employed which involves subjecting a mass of the material to substantially uniform heating throughout from about 100°, with such a control of the rate of heating, the time at the maximum temperature, and the predetermined degree of, such that the total time required is equivalent to approximately one sec. at 190° for substantially complete heat-treatment as desired.

C. A. 38, 3382 (1944).

(822) U. S. 2,338,384, Jan. 4, 1944, J. Robinson and H. Lowery, Dichlorethyl Ether Extraction Process. - The method of preventing emulsification

difficulties and increasing the effective capacity of a chlorex extraction system comprises introducing into the chlorex a small amount of a green acid soap, employing approximately one gallon of the green acid soap per 10,000 gallons of chlorex and withdrawing a green acid soap solution from the system as a separate phase.

O. & S. 21, 96 (1944).

(823) U. S. 2,340,909, Feb. 8, 1944, D. Traill, R. V. Seddon, and W. Sever, (to Imperial Chemical Industries, Ltd.), Spinnable Preparations from Peanut Protein. - An arrangement of apparatus is described, and a method is employed for preparing ammoniacal dispersions or solutions of peanut protein of thixotropic character, as spinnable liquids of a viscosity enabling them to be extruded through orifices into coagulating baths to form fibers, which involves subjecting a despersion of peanut protein 10-25% in dilute aqueous NH_3 solution of a concentration of about 0.2-2% to heating at a temperature above about 60° until the viscosity of the dispersion, with reference to a sample of it which is maintained in the absence of applied shearing stresses, is increased at least approximately 5-fold with respect to that of the original dispersion.

C. A. 38, 4453 (1944).

(824) U. S. 2,343,646, Mar. 7, 1944, C. F. Dinley (to Detroit Rex Products Co.), Still. - An invention related to solvent extraction process: a still designed to separate solvent from miscella containing soybean oil or the like.

O. & S. 22, 71 (1945).

(825) U. S. 2,345,576-8, Apr. 4, 1944, L. O. Buxton (to National Oil Products Co.), Stabilization of Vegetable and Animal Oils. - Vegetable oils and fats, such as soybean, wheat-germ, corn-germ, oat, rye, olive, sesame, cottonseed, linseed, oiticica oil, and fish-liver, e. g., cod, tuna, halibut, oil are treated with a solvent in proportions of 2-25% oil to solvent. Solvents suitable for the recovery of antioxidants are: aliphatic and alicyclic monohydroxy alcohols containing 3-6 C atoms, esters of less than 8 C atoms of aliphatic and alicyclic alcohols with aliphatic monocarboxylic acids, aliphatic and alicyclic aldehydes containing up to 6 C atoms, and aliphatic ketones of up to 6 C atoms. The most useful solvents for this purpose are iso-PrOH and diacetone. The reaction is carried out at room temperature or above in an inert gas atmosphere and should not exceed 175° if recovery of vitamins is desired. Afterwards the mixture of oil in solvent is cooled to 0-70° whereby 2 layers are formed. The solvent layer is filtered, the solvent is removed, and the extract, ordinarily more viscous than the original oil, contains large amounts of active antioxidants. This may be added in amounts of 0.1-20, but preferably 0.5-5%, to stabilize any oils, fats, waxes, soaps, vitamin concentrates, etc., which contain oxidizable organic substances. By a similar method, fish-liver oil of high vitamin content was refined by mixing it with a vegetable meal (e. g., soybean, alfalfa leaf, peanut meal, etc.) and a solvent for the oil, containing 1-10% of lower aliphatic monocarboxylic acid, e. g., acetone containing 5% AcOH. Independently, valuable antioxidant extracts were obtained by treating a vegetable meal with the above-mentioned solvents in an analogous procedure.

C. A. 38, 4464 (1944).

(826) U. S. 2,345,626, Apr. 4, 1944, E. C. Pattee (to National Distillers Products Corp.), Apparatus for Solvent Extraction of Grains, Rice Bran,

Oleaginous Seeds, or Flakes, Wood Chips, etc. - Means of passing oil-bearing material countercurrently to solvent in a "U"-shaped apparatus is described.
C. A. 38, 4476 (1944).

(827) U. S. 2,352,160, June 27, 1944, A. C. Brown (to Emery Industries, Inc.), Method of Distillation. - An invention related to the solvent extraction process: a still designed to separate solvent from oil.
O. & S. 22, 71 (1945).

(828) U. S. 2,352,546, June 27, 1944, J. D. Jenkins (to Pittsburgh Plate Glass Co.), Solvent Extraction Separation of Fatty Oils and Acids such as Those of Soybean, Cottonseed, Coconut, or Linseed Oil. - An arrangement of apparatus is described, and a mode of operation is employed which involves use of a furan compound, such as a furfural, as a selective solvent (suitably countercurrentwise and under a blanket of an inert gas such as free N) for a separation into two liquid phases, one containing the furan compound saturated with the more soluble unsaturated oil constituents and the other containing the less soluble more saturated constituents, saturated with the furan compound. Numerous examples and details are given.
C. A. 38, 5682 (1944).

(829) U. S. 2,352,883, July 4, 1944, D. S. Bolley (to National Lead Co.), Production and Purification of Fatty Oils. - For extraction of flaxseed, Bolley used acetone as solvent and followed the process with crystallizations at -25° and -68° so that a highly unsaturated linseed oil could be obtained.
O. & S. 22, 71 (1945).

(830) U. S. 2,353,551, July 11, 1944, F. S. Dexter (to Darward & Sons Co.), Evaporator Adapted for Separation of Solvents such as Acetone from Dissolved or Partially Dissolved Oils such as Those of Viscous Character. - Various structural and operative details of an apparatus employing steam as a heating medium in a conical heater over which the material flows as a thin film.
C. A. 38, 5700 (1944).

(831) U. S. 2,353,571, July 11, 1944, H. R. Kraybill, P. H. Brewer, and M. H. Thornton (to Purdue Research Foundation), Adsorption Recovery of Phosphatide Material from Vegetable Oils such as Soybean Oil, Cottonseed Oil, or Corn Oil. - Contact is effected between an oil and an adsorbent material such as silica foam or a specially prepared NaAl silicate (suitably in a filter column), and the solid and adsorbed material is separated, washed with an oil solvent such as acetone, and the phosphatide material is removed from the solid by washing it with a solvent such as EtOH or Et_2O which is subsequently evaporated from the phosphatide material. Numerous solvents and adsorbents are mentioned which may be used.
C. A. 38, 6121 (1944).

(832) U. S. 2,358,219, Sept. 12, 1944, J. P. Dickson and W. Sever (to Imperial Chemical Industries, Ltd.), Spinning Solution for Peanut-Globulin Fibers. - Peanut-globulin is dissolved at its isoelectric region in an aqueous alkali hydroxide solution. The alkali hydroxide concentrate is 0.7-1.5 equivalent of NaOH per 100 parts of H_2O. The pH of the freshly prepared solution is at least 12.5 but lower than the pH at which substantial

hydrolysis of the protein could ensure or cause a substantial change in the viscosity of the solution. The solution is matured to a spinning solution, and the latter is spun into a coagulating bath. The latter contains Na_2SO_4 at least 10 and H_2SO_4 0.25-2.5% and is maintained at approximately 40°.

C. A. 39, 1548 (1945).

(833) U. S. 2,358,427, Sept. 19, 1944, D. Traill (to Imperial Chemical Industries, Ltd.), Peanut Protein Filaments. - An aqueous dilute alkaline solution of peanut protein is extruded into a coagulating bath. The coagulated filament is withdrawn from the coagulating bath at a rate 3-8 times the rate of extrusion thus stretching the coagulated filament. After leaving the coagulating bath and while still mechanically stretched, the filament is treated with a saturated aqueous NaCl solution, thereby reducing the tendency to shrink. Next the mechanical tension is released and the filament is treated with a hardening agent which renders it resistant to hot H_2O and acid dye baths. C. A. 39, 1549 (1945).

(834) U. S. 2,361,780, Oct. 31, 1944, H. J. Lewis (to Shell Development Co.), Duosol Extraction Process and Apparatus. - Two liquids partly immiscible but containing components soluble in both are passed countercurrent to one another. One of these liquids, and preferably, the heavier is broken up into droplets of preferably 1/16-3/16 in. diameter by passing it through a perforated plate or pipe. After coming in close contact with each other the two liquids separate and are withdrawn separately. This process is suitable for refining hydrocarbon oils, fatty acids, fatty alcohols, fatty oils, etc., by treating them with a selective solvent for a part of their components and with an auxiliary solvent for other of their components. As an example, for the selective solvent may be taken a phenol-cresol mixture while, e. g., propane is used as the auxiliary solvent. Several modifications of the apparatus are described.

C. A. 39, 2436 (1945).

(835) U. S. 2,370,138, Feb. 27, 1945, M. Bonotto (to Extractol Process, Ltd.), Processes and Apparatus for Filtering Miscella and Like Mixtures Through a Filtering Medium of Solid Oil-Bearing Material. - Bonotto introduced clarifying filters for extraction of miscella in a countercurrent solvent extraction system.

O. & S. 23, 115 (1946).

(836) U. S. 2,370,614, Mar. 6, 1945, E. Bohm (to L. von Roll Aktiengesellschaft fur kommunale Analagen), Extraction Apparatus. - Bohm's horizontally-rotating mounted cylindrical extraction vessel was improved by adding filtering means in the interior and by imparting oscillatory movement to the vessel. O. & S. 23, 115 (1946).

(837) U. S. 2,376,568, May 22, 1945, A. M. Altschul and M. L. Karon, Treatment of Oilseeds. - This process of treating oilseeds comprised treating with a volatile base, such as ammonia or morpholine, at least one week before extraction; such seeds yielded a considerably lighter-colored oil.

O. & S. 23, 115 (1946).

(838) U. S. 2,376,852, May 22, 1945, A. M. Altschul and M. L. Karon, Treatment of Oilseeds. - The process comprises treating oilseeds with a volatile

base to raise the pH to not less than 8, storing for not less than one week, and thereafter extracting oil therefrom, whereby the oil is considerably lightened in color.

O. & S. 22, 209 (1945).

(839) U. S. 2,377,135-6, May 29, 1945, C. F. Dinley and W. L. McCracken (to Detroit Rex Products Co.), Extraction Method. - Designs for a continuous oil extractor are described. A novel means of completely recovering the solvent volatilized is explained.

O. & S. 22, 209 (1945).

(840) U. S. 2,377,975, June 12, 1945, P. A. Singer and H. J. Deobald (to Allied Mills, Inc.), Solvent Extraction of Vegetable Oil. - Oil is extracted batchwise from seeds with a mixture of 70-80% EtOH and 30-20% isoPrOH (by volume) at atmospheric pressure. In an example, cleaned and flaked soybeans containing not over 3.5% H_2O are extracted with 75% EtOH-25% isoPrOH (by volume) at 170°F., just below the boiling point, in a suitable apparatus at one atmosphere. The extract is cooled to 80°F. or lower and 85% of the oil separates by gravity in 16-20 hours. The oil phase is vacuum dried and filtered with diatomaceous earth. The product is essentially "nonbreak" on heating to 600°F. Phosphatides are separated from the solvent phase by a salting-out process with one gram $CaCl_2$/lb. solvent. Details of solvent reuse and cycling are given. The soybean meal contains 57-59% protein when the flakes are produced from dehulled beans.

C. A. 39, 4505 (1945).

(841) U. S. 2,377,976, P. A. Singer and H. J. Deobald (to Allied Mills, Inc.), Solvent Extraction of Vegetable Oil. - A continuous process of solvent extraction is described.

C. A. 39, 4505 (1945).

(842) U. S. 2,381,965, Aug. 14, 1945, N. E. Berry (to General Foods Corp.), Solvent Extraction of Solid Materials. - This invention is a countercurrent solvent extraction system using either a "U" or "V" shaped container.

O. & S. 23, 115 (1945).

(843) U. S. 2,383,398, Aug. 21, 1945, H. T. Love (dedicated to free use of People in the Territory of the United States), Process for Extracting Oil from Avocados. - A digestion with alkalies was recommended in a process for extracting avocado oil. The final recovery is by skimming, but for greater efficiency, filter presses, solvent extraction, and centrifuges may be used in the final stages of the process.

O. & S. 23, 115 (1946).

(844) U. S. 2,405,105, July 30, 1946, A. B. Kennedy, Apparatus for Solvent Extraction of Oils from Seeds. - Claim 6. In leaching apparatus for extracting a soluble constituent from solid material by means of a fluid solvent, the combination of a pair of adjacent tubs adapted to contain both said fluid and said solid material, a rotatable paddle wheel associated with one of said tubs and having a plurality of blades adapted, during rotation of said paddle wheel, to advance the solid material in its associated tub toward the other of said tubs, and means associated with said paddle wheel for removing from said blades all of said material advanced thereby

and for effecting deposit of said advanced material in said other tub, said removing means comprising a pivotally mounted member normally occupying a position in the path of movement of and adapted to be successively engaged by each of said blades during rotation of said paddle wheel, the engagement of said member by said blades causing said member to swing on its pivotal axis while maintaining engagement with each blade in succession to thereby remove the solid material from each blade during swinging movement thereof.
Off. Gaz. 588, 780 (1946).

(845) U. S. 2,405,830, Aug. 13, 1946, G. W. Irving, Jr., A. L. Merrifield, R. S. Burnett, and E. D. Parker (to U. S. D. A., U. S. A.), Recovering Peanut Protein. - A process is given for the production of an improved white peanut meal protein. C. A. 40, 7450 (1946).

(846) U. S. 2,406,650, Aug. 27, 1946, R. L. Wormell (to Courtaulds, Ltd.), The Extraction of Protein from Seeds. - A process for extracting protein from seeds consists of treating the oil-free seed meal with a solution containing an alkali and, just before separation by filtration or centrifuging, adding less than 40% by volume of acetone or a water-miscible monohydric alcohol. C. A. 40, 7668 (1946).

(847) U. S. 2,413,692, Jan. 7, 1947, E. H. Crowther (to Aquacide Co.), Oil Separation Method for Vitaminiferous Protein Material and the Like. - Oil from fish liver, using water to float off oil.

(848) U. S. 2,415,426, Feb. 11, 1947, S. B. Henning, Isolation of Proteins. - A novel method is described of rapid settling and clarification of alkaline (NaOH or Na_2SO_3) solutions of soybean, peanut, and cottonseed proteins by adding to the solutions 1 to 5% of AcONa by weight of meal and warming to 130°F. to aid in settling and agglomeration of gummy and mucilaginous bulky impurities. Preliminary acid leach of the meal with AcOH at the protein isoelectric point and addition of lime 5%, and Ba peroxide 1 to 3%, also facilitate filtration; protein extracted by this procedure has reduced viscosity characteristics.
C. A. 41, 2456 (1947).

(849) U. S. 2,416,196, Feb. 18, 1947, E. N. Mortenson (to Industrial Patents Corp.), Solvent Extraction of Fatty Materials. - A rapid and efficient method is described for extracting oleaginous materials from solids containing appreciable amounts of H_2O. An aqueous slurry of fatty material is agitated in the presence of a fat solvent while the mixture is heated to a temperature just below the boiling point of the solvent. The resultant emulsion of solvent, water, and oleaginous materials is broken by reducing the agitation while maintaining a high temperature; thus two layers are formed. The solvent layer is separated and the fat is recovered by removal of solvent. The preferred solvents include petroleum fractions of boiling points between 105 and 250°, higher-boiling ethers and ketones, xylene, and chlorobenzene. C. A. 41, 3642 (1947).

(850) U. S. 2,416,421, Feb. 25, 1947, H. Truax (to Indiana Farm Bureau Co-Operative Association, Inc.), Extractor for Soybean Oil. - The extractor is provided with special arrangements for the removal of suspended fines.
C. A. 41, 3985 (1947).

(851) U. S. 2,417,507, Mar. 18, 1947, E. Levin, Flaking Sunflower Seed for Solvent Extraction. - Before flaking the seeds are heated at 80-120° to partially coagulate the protein.

O. & S. 24, 254 (1947).

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** Because of the limited information available, it is questionable whether these references refer to freshly crushed seeds or to press-cake meal.

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* Because of the limited information available, it is questionable whether these references refer to freshly crushed seed or to press-cake meal.

** See footnote on Oilseeds, meal from, press-cake.

*** Because of the limited information available, it is questionable whether these references refer to the solvent extraction of oils from oleaginous materials or the selective solvent extraction of the oils themselves.

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